

The Slippery Slope of Aging: Preventing Slips and Falls as America Ages

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OSHA's Revised Rule

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DOL/OSHA RIN: 1218-AB80 Publication ID: Fall 2014

Title: Walking Working Surfaces and Personal Fall Protection Systems (Slips, Trips, and Fall Prevention)

Abstract: In 1990, OSHA published a proposed rule (55 FR 13360) addressing slip, trip, and fall hazards and establishing requirements for personal fall protection systems. Slips, trips, and falls are among the leading causes of work-related injuries and fatalities. Since that time, new technologies and procedures have become available to protect employees from these hazards. The Agency has been working to update these rules to reflect current technology. As a result of issues raised in comments to the 1990 NPRM, OSHA published a notice to reopen the rulemaking for comment on May 2, 2003. Based on comments received on the 2003 notice, OSHA determined that the rule proposed in 1990 was out-of-date and did not reflect current industry practice or technology. The Agency published a second proposed rule on May 24, 2010, which reflected current information and increased consistency with other OSHA standards. Hearings were held on January 18 through 21, 2011.

Agency: Department of Labor(DOL) Priority: Economically Significant

RIN Status: Previously published in the Unified Agenda Agenda Stage of Rulemaking: Final Rule Stage

Major: Yes Unfunded Mandates: No

CFR Citation: 29 CFR 1910, subparts D and I (To search for a specific CFR, visit the [Code of Federal Regulations](#).)

Legal Authority: [29 USC 655\(b\)](#)

Legal Deadline: None

Timetable:

| Action | Date | FR Cite |
|--------------------------------|------------|-----------------------------|
| NPRM | 04/10/1990 | 55 FR 13360 |
| NPRM Comment Period End | 08/22/1990 | |
| Hearing | 09/11/1990 | 55 FR 29224 |
| Reopen Record | 05/02/2003 | 68 FR 23527 |
| Comment Period End | 07/31/2003 | |
| Second NPRM | 05/24/2010 | 75 FR 28861 |
| Second NPRM Comment Period End | 08/23/2010 | |
| Notice of Informal Hearing | 11/12/2010 | 75 FR 69369 |
| Public Hearing | 01/18/2011 | |
| Analyze Comments | 08/29/2011 | |
| Final Rule | 08/00/2015 | |

Regulatory Flexibility Analysis Required: No Government Levels Affected: None

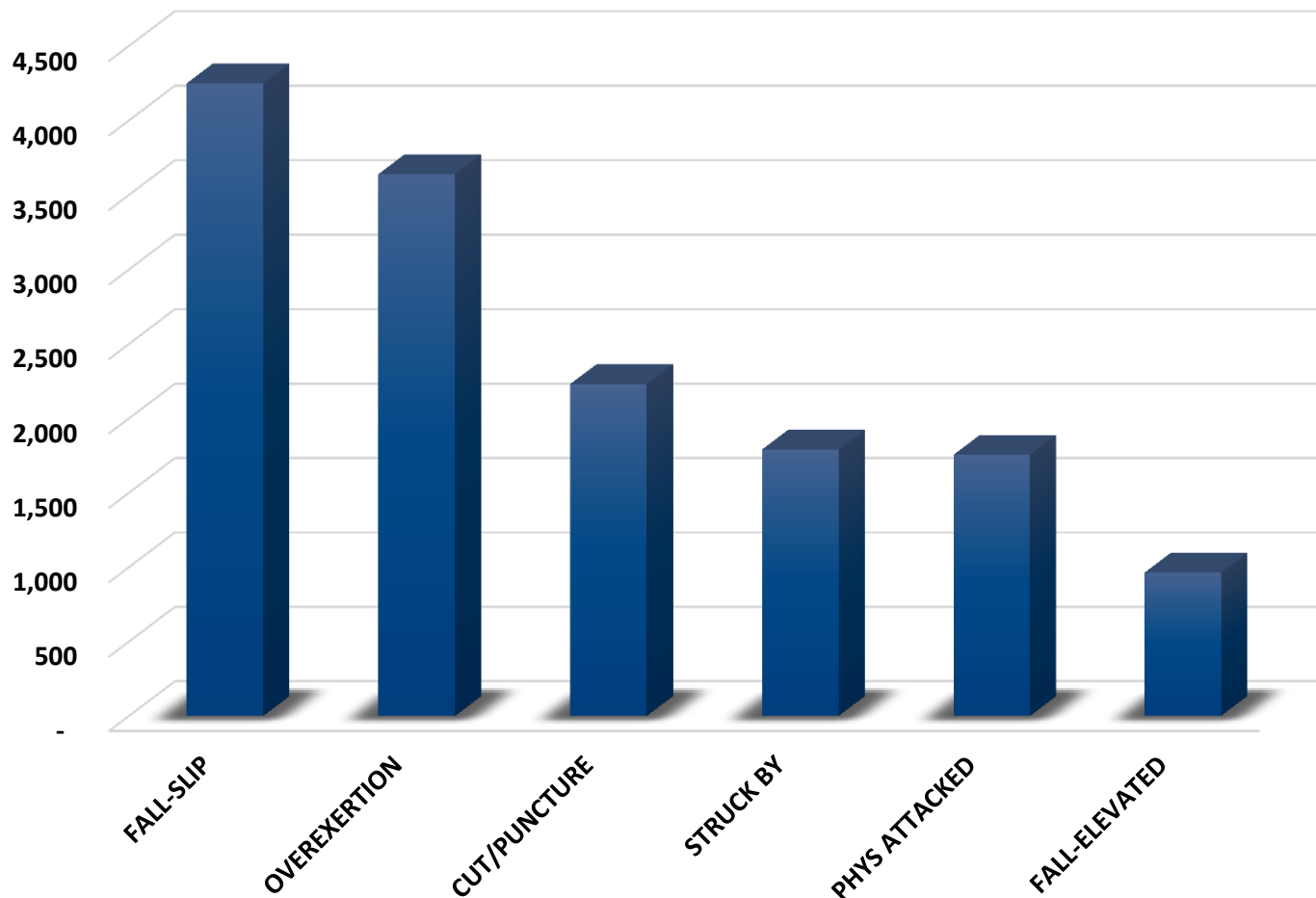
Effective Aug. 2015

Requires inspection of all walk/work surfaces for STF hazards
Includes floors, stairs, parking lots, sidewalks

Keys to Slip/Fall Prevention

1. Appoint and train a Slip Prevention “Champion”
2. Audit walking surfaces regularly
3. Make it easy for anyone to report slip/fall hazards
4. Maintain smooth, even walking surfaces... minimize clutter
5. Highlight any changes in elevation so they are noticeable
6. Monitor and enhance the traction of flooring
7. Require slip resistant footwear for wet/oily areas
8. Comprehensive mat strategy – keep the elements outside and don’t let mats become a trip hazard
9. Snow/ice management program – timely treatment
10. Awareness/Human Factor training & proper use of warning signs

Most Frequent Workplace Accident Types



Slips are often unreported, but still rank #1

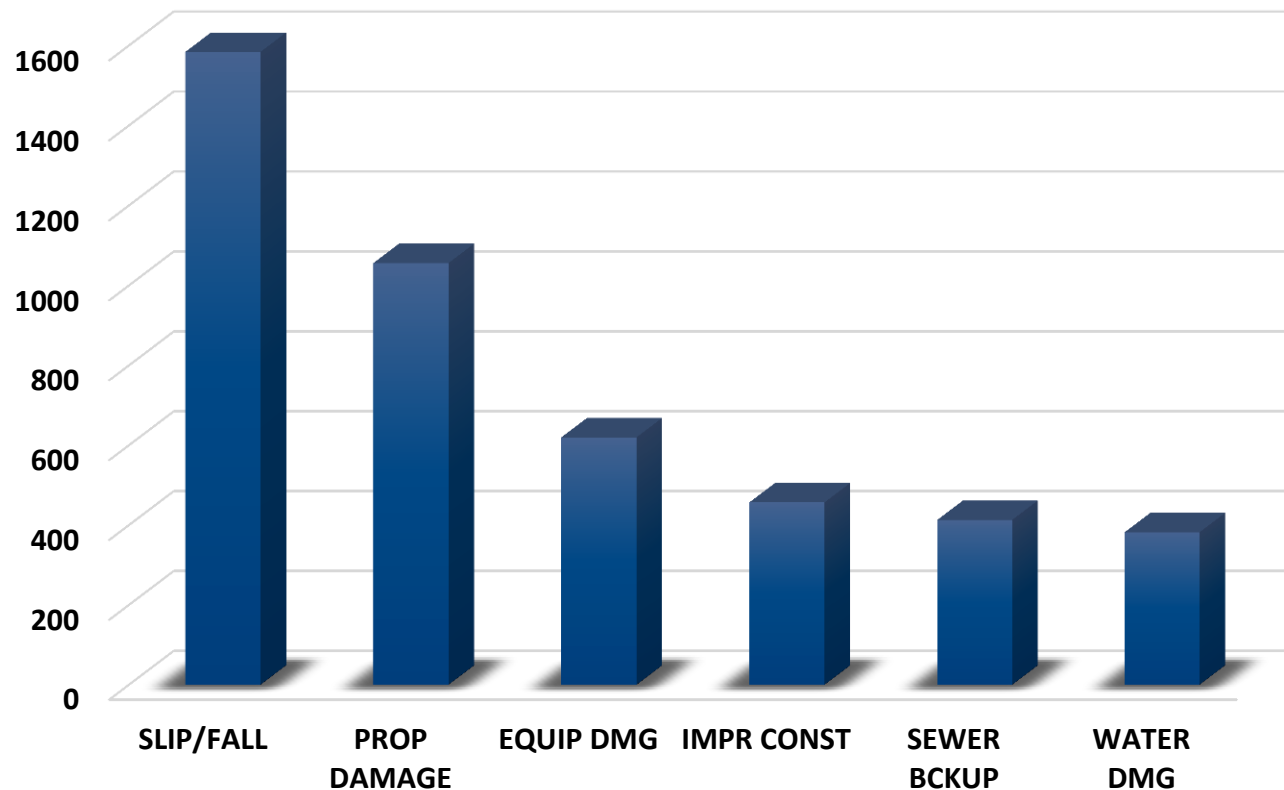


FOCUSED

2012-2014 EMC Countrywide Data



General Liability Claims



1 for both frequency & severity



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2012-2014 EMC Countrywide Data

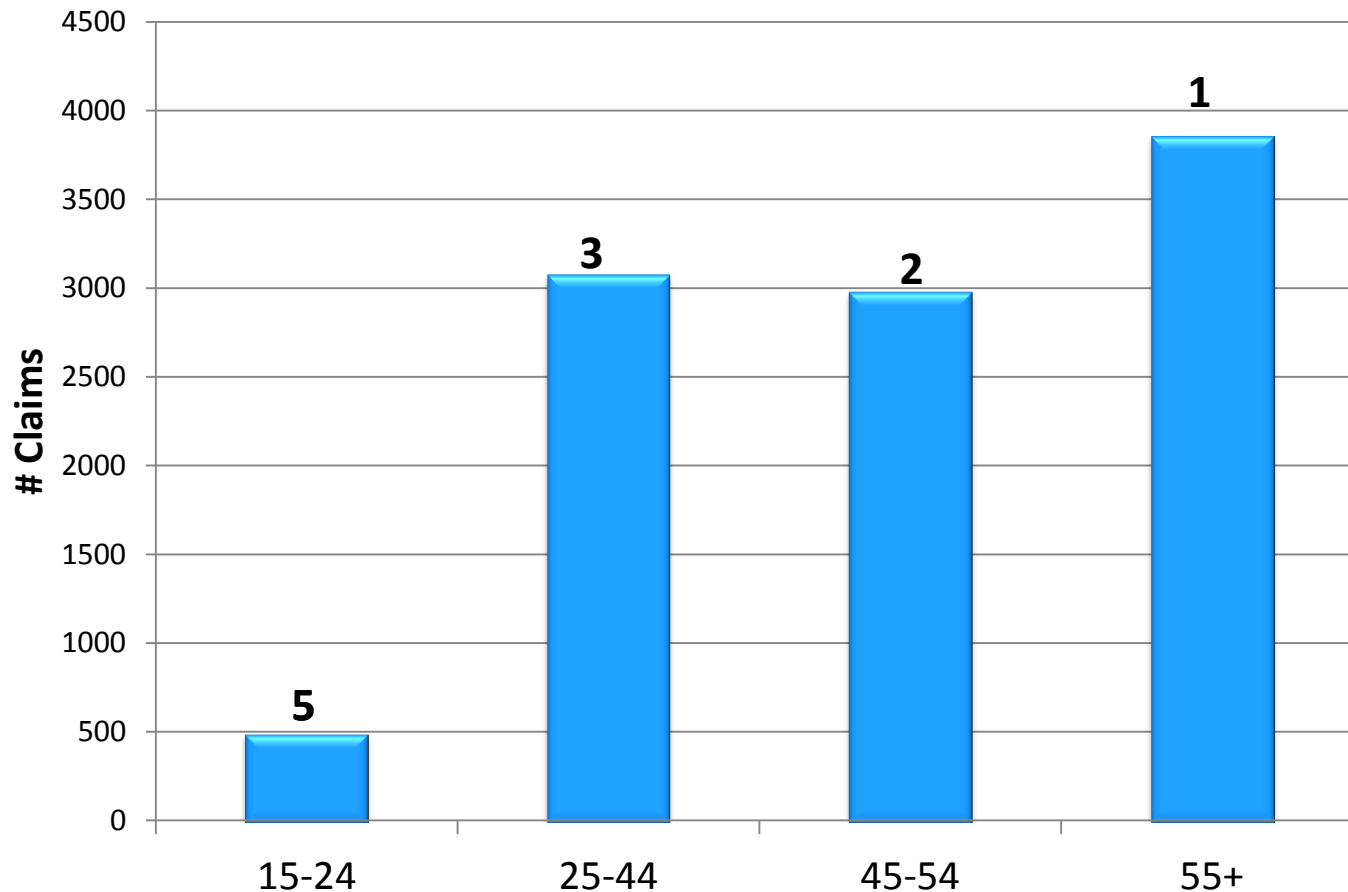


Falls

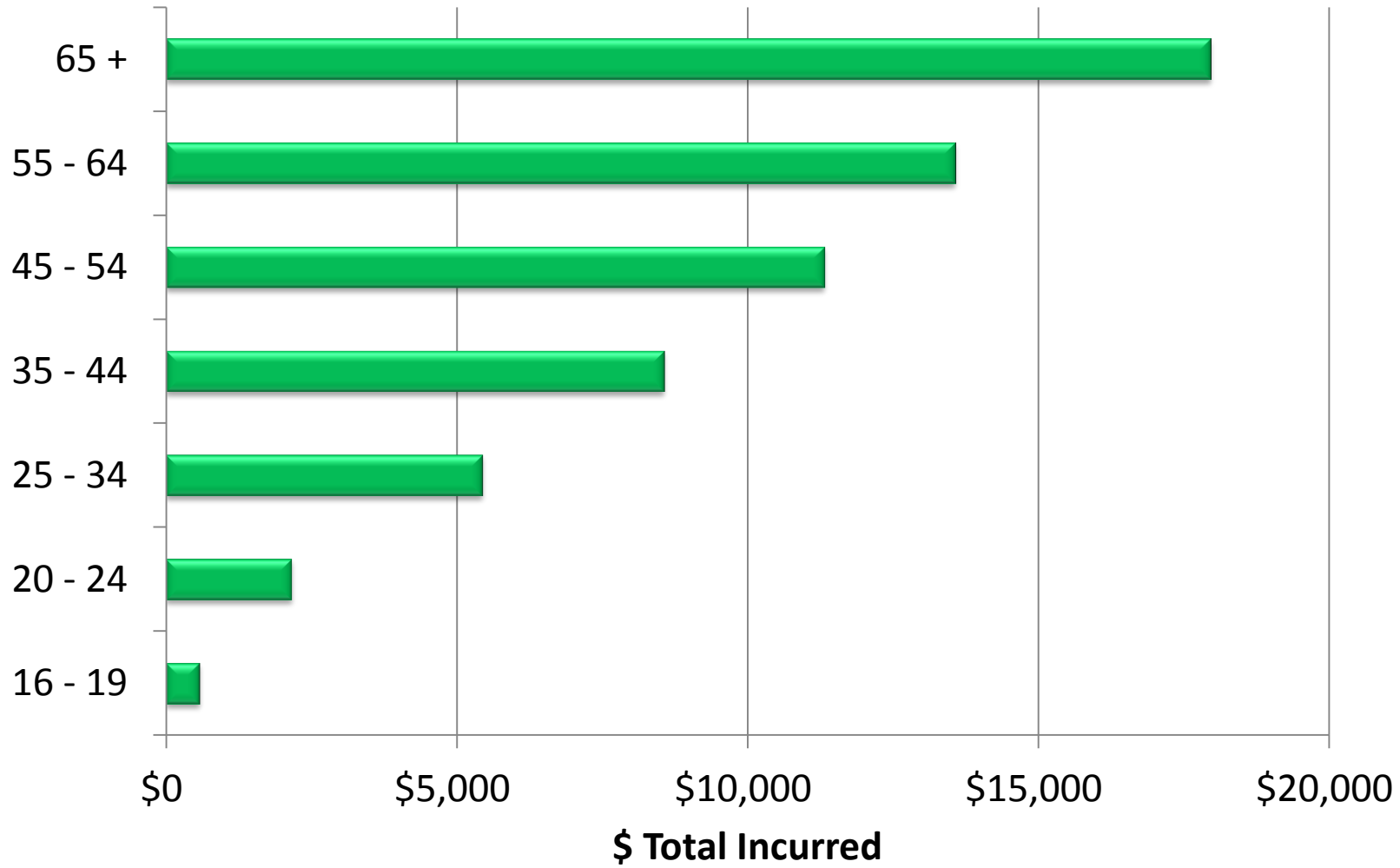
- Leading cause of non-fatal injuries for people ages 25+
- Account for 26% of injury-related visits to the emergency department.*

*National Safety Council Injury Facts® 2014 Edition

Slip/Fall Frequency Ranking by Age



Slip/Fall Claim Cost by Age



National Estimates of the 10 Leading Causes of Nonfatal Injuries Treated in Hospital Emergency Departments, United States – 2012

| Rank | Age Groups | | | | | | | | | | Total |
|------|---|---|---|---|--|--|---|---|--|---|---|
| | <1 | 1-4 | 5-9 | 10-14 | 15-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ | |
| 1 | Unintentional Fall 145,406 | Unintentional Fall 928,693 | Unintentional Fall 682,972 | Unintentional Struck By/Against 612,890 | Unintentional Struck By/Against 1,015,214 | Unintentional Fall 781,424 | Unintentional Fall 723,904 | Unintentional Fall 925,945 | Unintentional Fall 881,178 | Unintentional Fall 2,422,463 | Unintentional Fall 8,974,762 |
| 2 | Unintentional Struck By/Against 33,070 | Unintentional Struck By/Against 385,146 | Unintentional Struck By/Against 427,701 | Unintentional Fall 600,403 | Unintentional Fall 882,214 | Unintentional Struck By/Against 648,632 | Unintentional Overexertion 552,464 | Unintentional Overexertion 480,093 | Unintentional Struck By/Against 269,407 | Unintentional Struck By/Against 280,326 | Unintentional Struck By/Against 4,553,417 |
| 3 | Unintentional Other Bite/Sting 14,293 | Unintentional Other Bite/Sting 172,438 | Unintentional Cut/Pierce 119,092 | Unintentional Overexertion 318,459 | Unintentional Overexertion 728,819 | Unintentional Overexertion 643,571 | Unintentional Struck By/Against 467,962 | Unintentional Struck By/Against 412,908 | Unintentional Overexertion 259,092 | Unintentional Overexertion 213,553 | Unintentional Overexertion 3,385,128 |
| 4 | Unintentional Foreign Body 11,245 | Unintentional Foreign Body 145,117 | Unintentional Other Bite/Sting 111,305 | Unintentional Cut/Pierce 126,902 | Unintentional MV-Occupant 666,833 | Unintentional MV-Occupant 539,425 | Unintentional MV-Occupant 392,071 | Unintentional MV-Occupant 358,304 | Unintentional MV-Occupant 232,972 | Unintentional MV-Occupant 197,951 | Unintentional MV-Occupant 2,564,003 |
| 5 | Unintentional Fire/Burn 10,837 | Unintentional Cut/Pierce 90,907 | Unintentional Overexertion 93,654 | Unintentional Pedal Cyclist 98,448 | Unintentional Cut/Pierce 444,644 | Unintentional Cut/Pierce 415,539 | Unintentional Cut/Pierce 310,662 | Unintentional Other Specified 318,190 | Unintentional Cut/Pierce 186,182 | Unintentional Cut/Pierce 152,185 | Unintentional Cut/Pierce 2,145,927 |
| 6 | Unintentional Inhalation/Suffocation 9,658 | Unintentional Overexertion 89,007 | Unintentional Pedal Cyclist 82,935 | Unintentional Unknown/Unspecified 88,748 | Other Assault* Struck By/Against 423,804 | Other Assault* Struck By/Against 346,347 | Unintentional Other Specified 264,926 | Unintentional Cut/Pierce 293,852 | Unintentional Other Specified 175,130 | Unintentional Poisoning 99,618 | Unintentional Other Specified 1,580,574 |
| 7 | Unintentional Other Specified 9,120 | Unintentional Other Specified 68,237 | Unintentional Foreign Body 64,755 | Unintentional MV-Occupant 77,363 | Unintentional Other Specified 320,844 | Unintentional Other Specified 294,541 | Other Assault* Struck By/Against 217,972 | Unintentional Poisoning 216,942 | Unintentional Poisoning 128,260 | Unintentional Other Bite/Sting 90,300 | Other Assault* Struck By/Against 1,361,096 |
| 8 | Unintentional Overexertion 6,416 | Unintentional Fire/Burn 56,711 | Unintentional MV-Occupant 60,056 | Other Assault* Struck By/Against 71,276 | Unintentional Other Bite/Sting 191,062 | Unintentional Other Bite/Sting 193,519 | Unintentional Poisoning 162,002 | Other Assault* Struck By/Against 174,556 | Unintentional Other Bite/Sting 103,825 | Unintentional Other Specified 79,395 | Unintentional Other Bite/Sting 1,250,916 |
| 9 | Unintentional Cut/Pierce 5,963 | Unintentional Unknown/Unspecified 45,276 | Unintentional Dog Bite 46,565 | Unintentional Other Bite/Sting 69,914 | Unintentional Unknown/Unspecified 154,866 | Unintentional Poisoning 156,817 | Unintentional Other Bite/Sting 148,512 | Unintentional Other Bite/Sting 155,748 | Other Assault* Struck By/Against 71,819 | Unintentional Other Transport 68,187 | Unintentional Poisoning 972,923 |
| 10 | Unintentional Unknown/Unspecified 5,020 | Unintentional Dog Bite 38,556 | Unintentional Unknown/Unspecified 38,208 | Unintentional Other Transport 49,358 | Unintentional Poisoning 147,636 | Unintentional Unknown/Unspecified 113,467 | Unintentional Unknown/Unspecified 90,213 | Unintentional Unknown/Unspecified 85,383 | Unintentional Other Transport 52,056 | Unintentional Unknown/Unspecified 62,327 | Unintentional Unknown/Unspecified 734,164 |

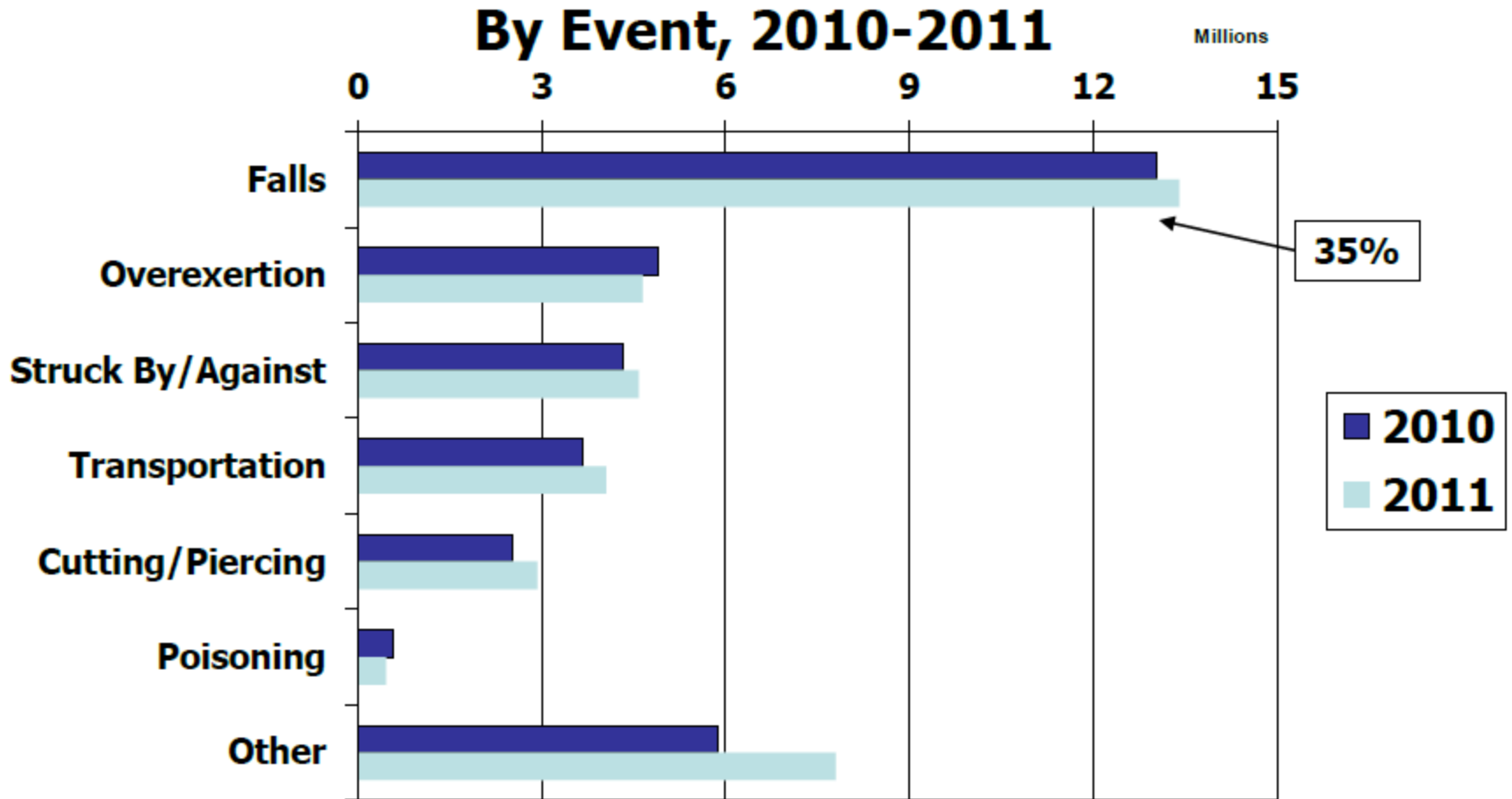


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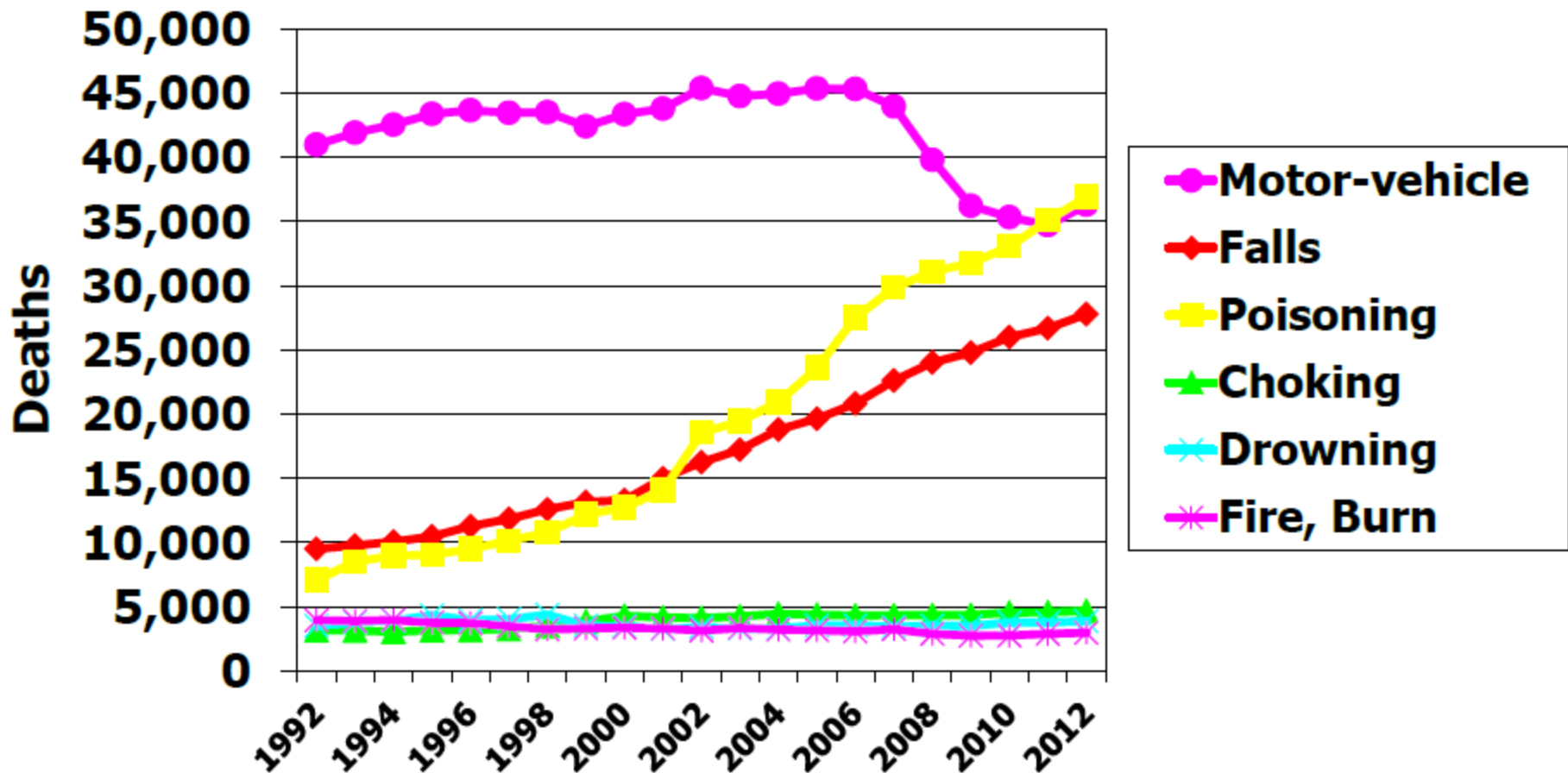
Source: CDC



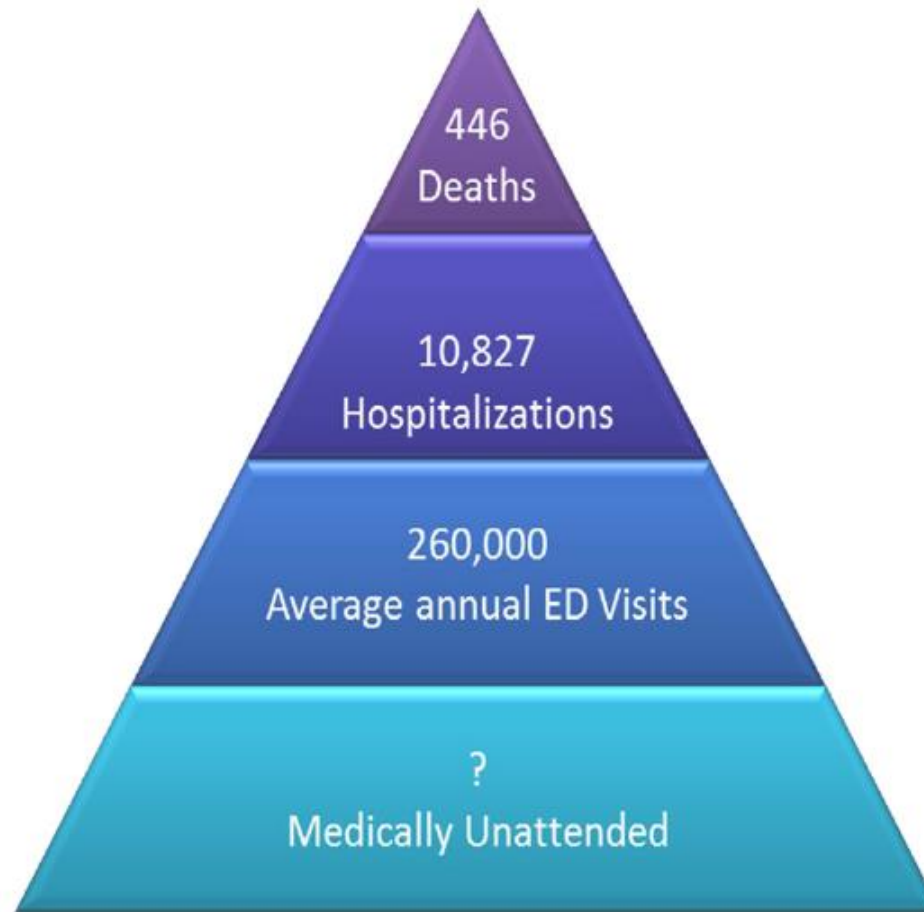
Medically Attended Nonfatal Injuries



Unintentional Injury Deaths



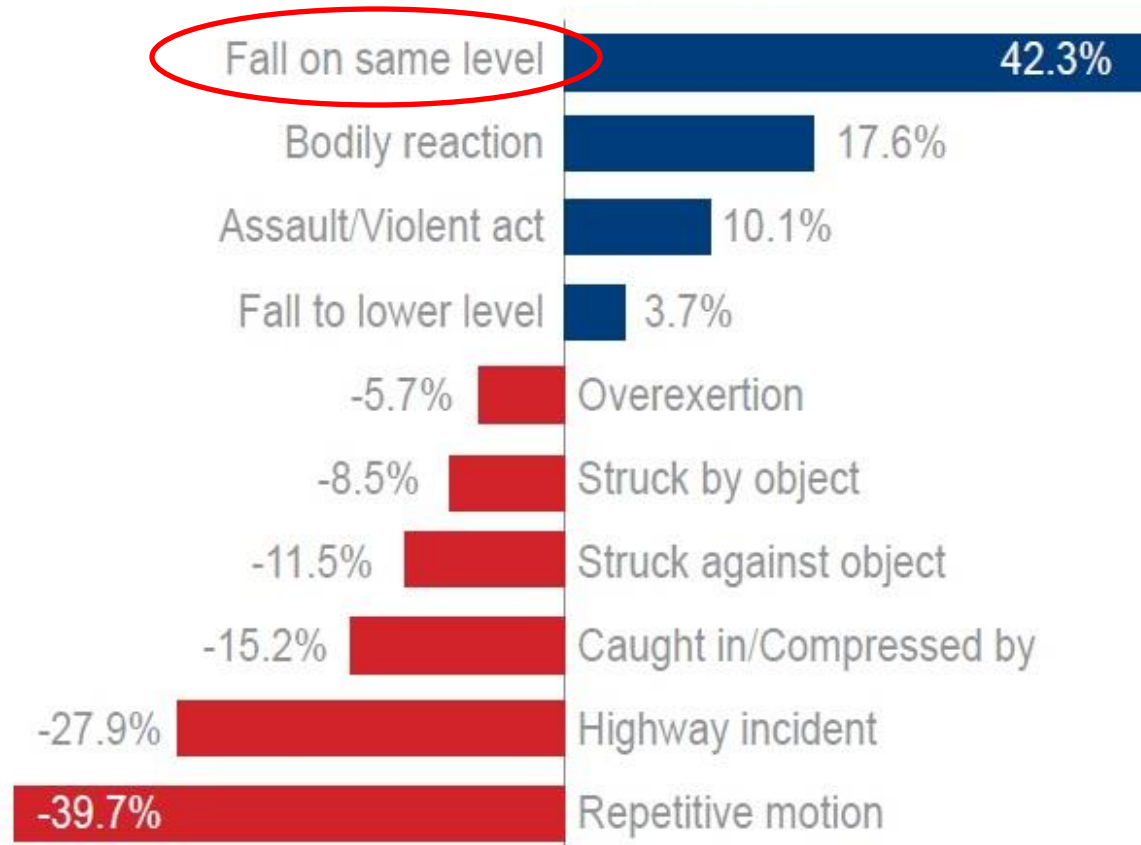
Iowa Facts - Falls



All ages, annual averages 2009—2013

Slip/Fall Data

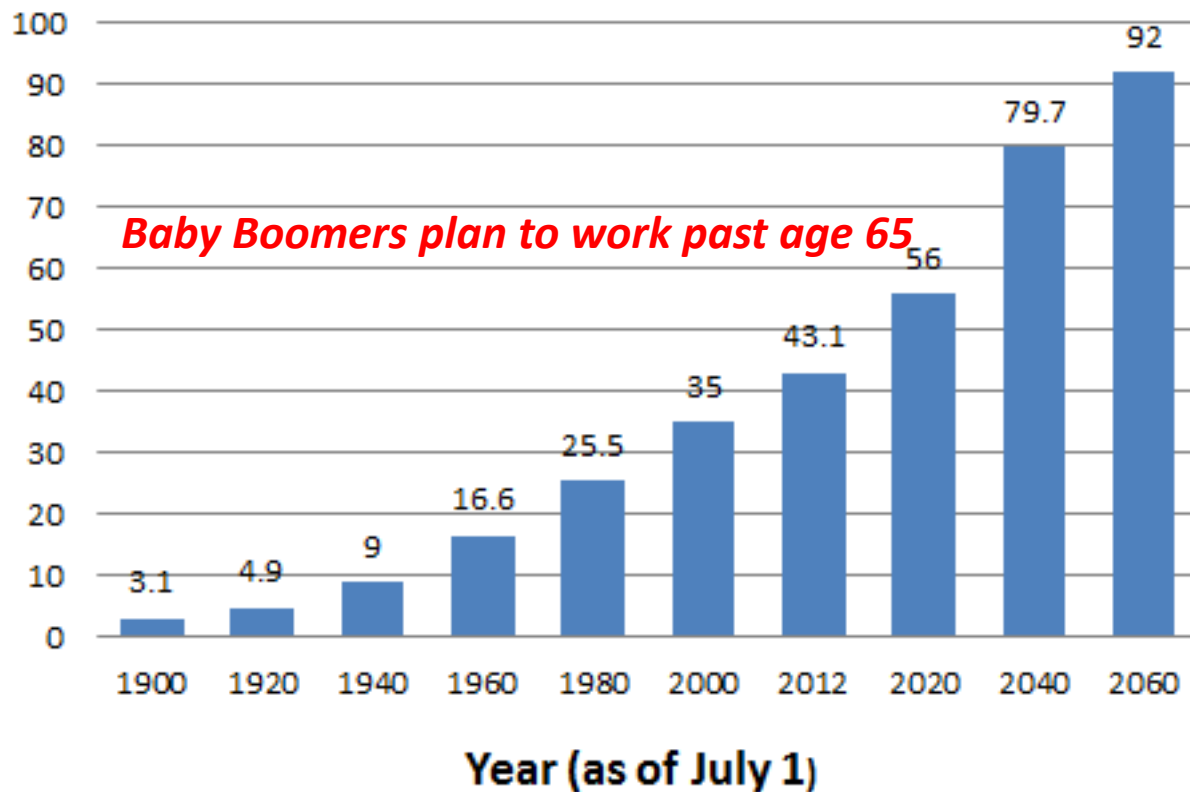
Real Growth Trends 1998-2010
(Percent change by category)



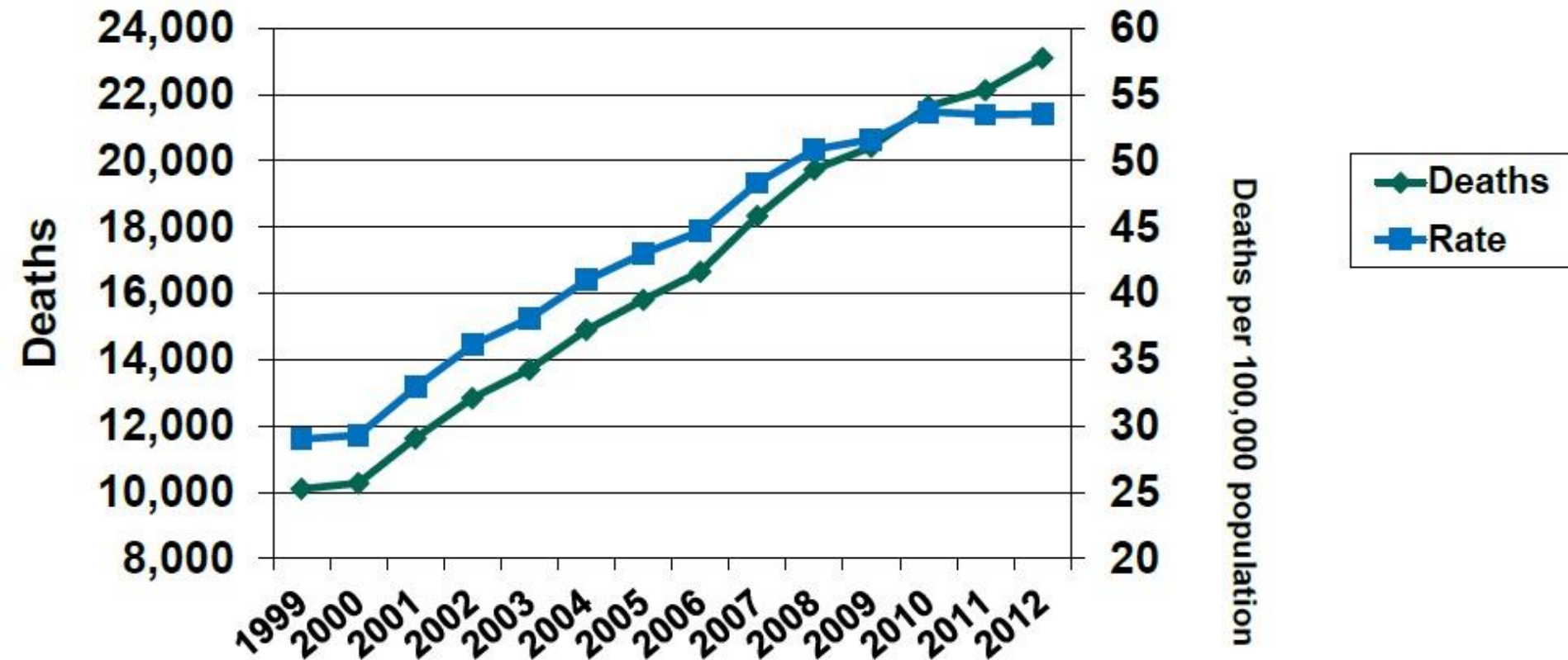
2012 Liberty Mutual Workplace Safety Index

Silver Tsunami

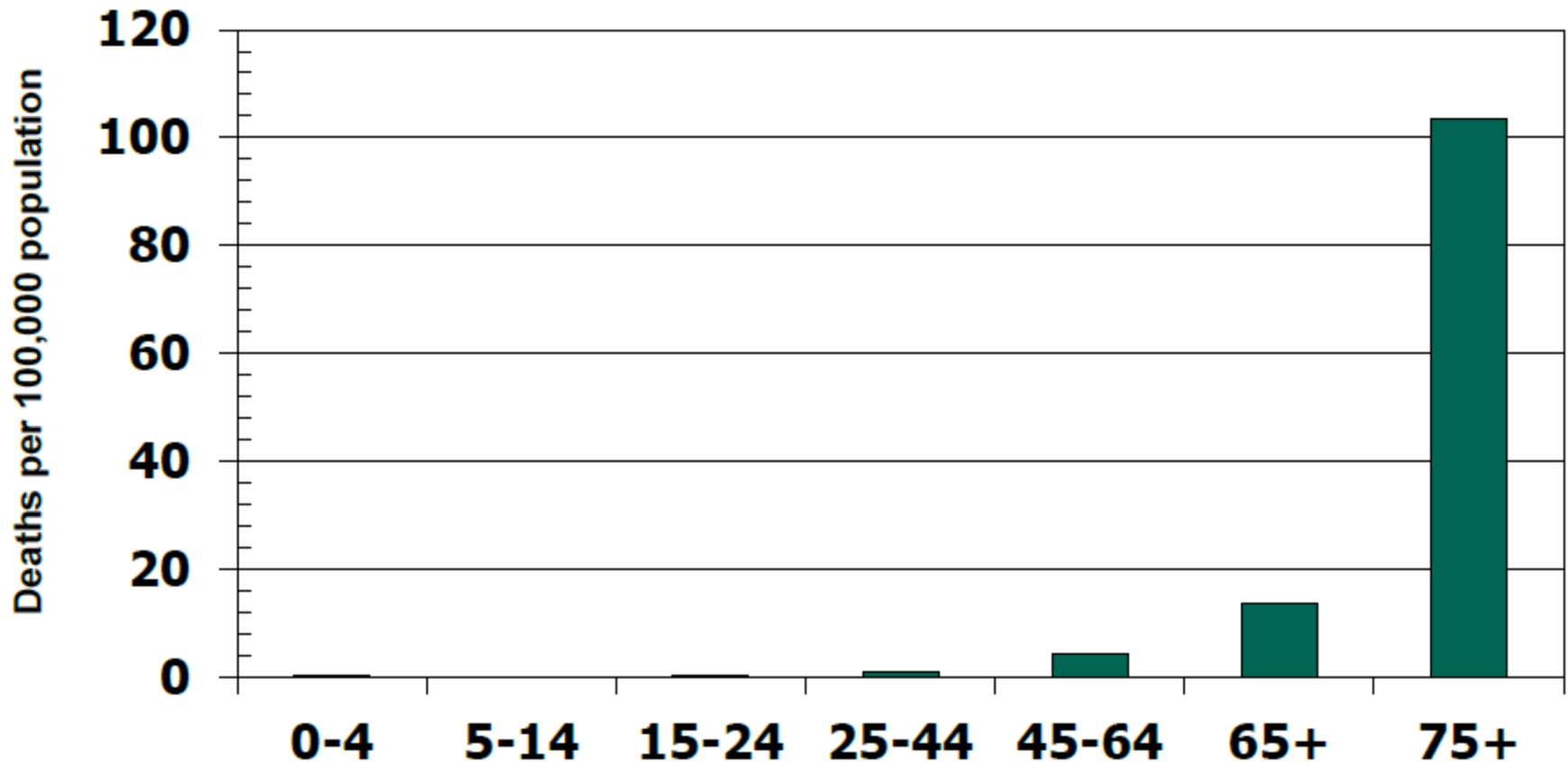
**Figure 1: Number of Persons 65+,
1900 to 2060** (numbers in millions)



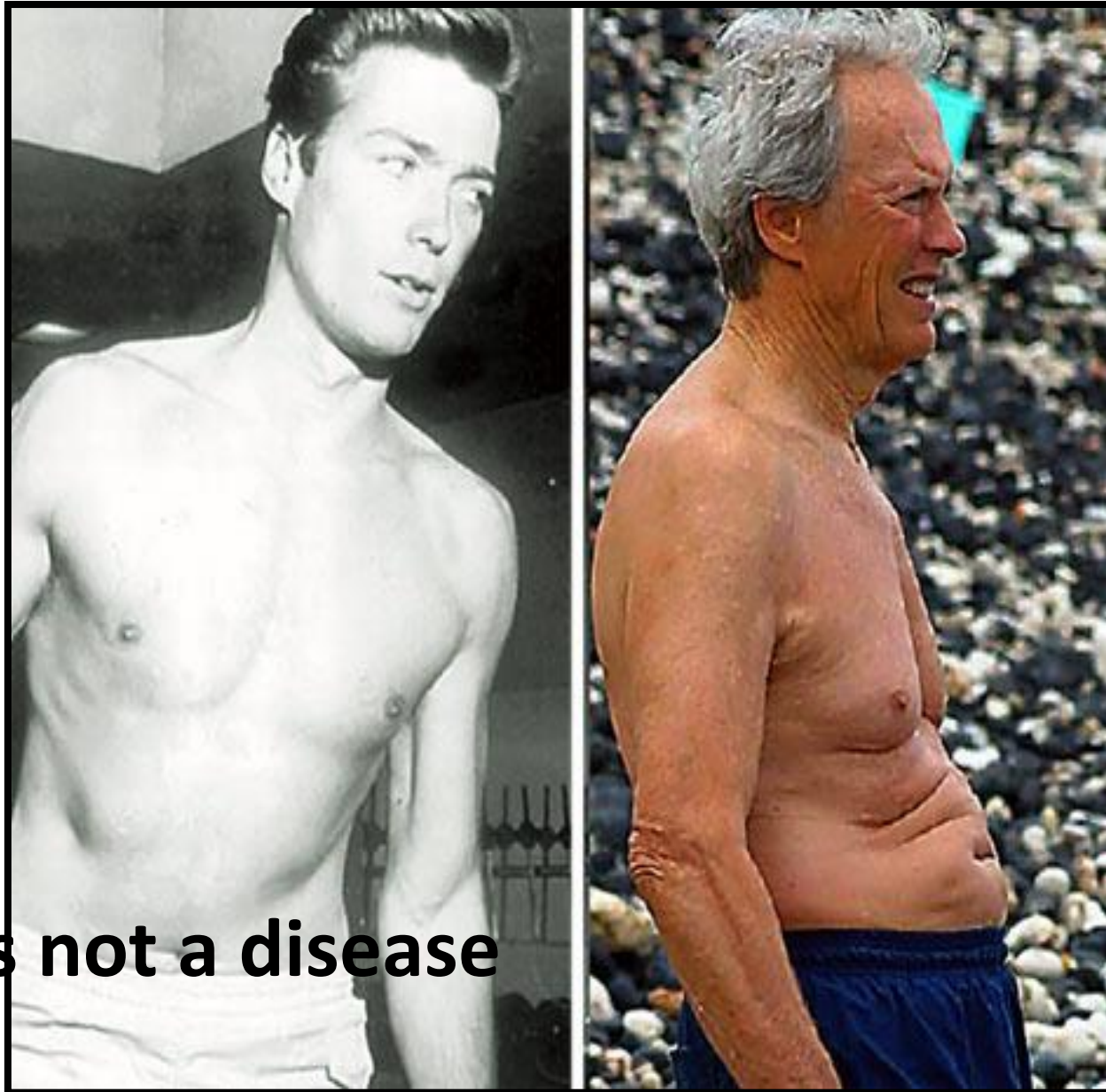
Trends in Fatal Falls – Age 65+



Fall Death Rate by Age Group, 2012



Aging is not a disease



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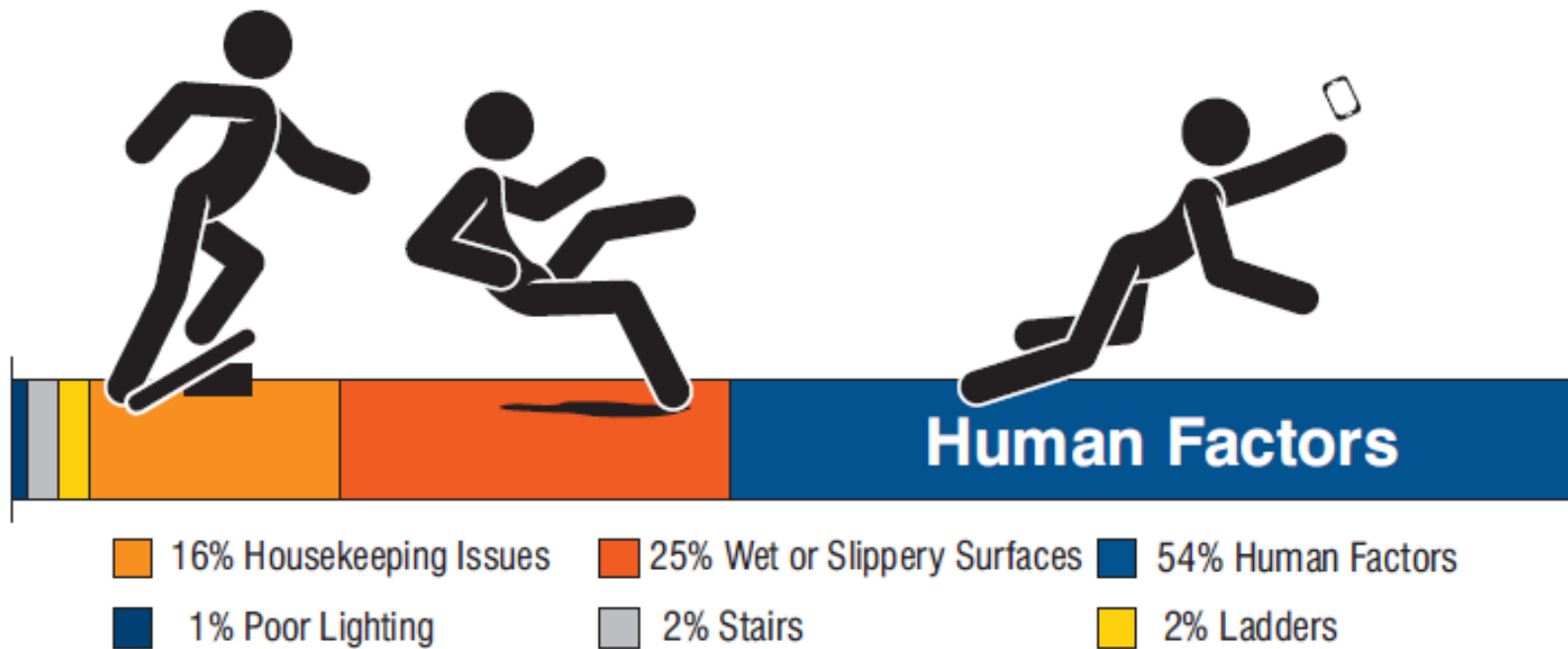
Aging is not a disease

- Strength & endurance – lose 10% per decade after 30, less able to compensate for slippery or uneven surfaces
- Gait issues – Osteoarthritis, joints less flexible, shuffle feet
- Vision - depth perception, contrast, glare
- Hearing - balance
- Nervous System – slower reaction time
- Cognitive skills/memory ?

Other Age-Related Risk Factors

- Heel cord tightness, Poor hip/ankle flexibility
- Postural Sway (especially females)
 - Sway studies – takes longer to reestablish balance
- Problems with feet (diabetes, shoes too big)
- Increased use of Rx (>3 is an indicator)

Most Frequent STF Factors



Human Factors

- ✓ Rushing
- ✓ Distraction
- ✓ Fatigue
- ✓ Complacency



Distracted Walking

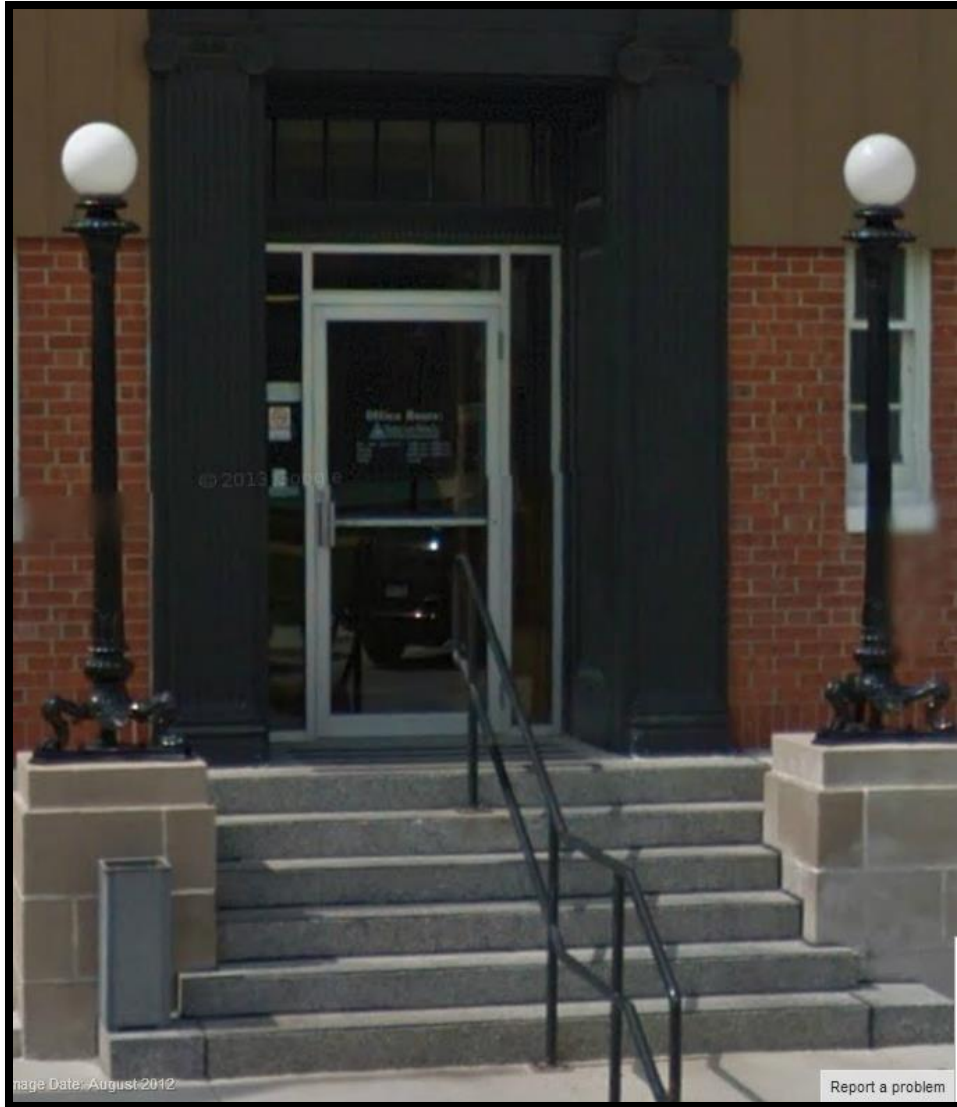


Distracted Walking



The cartons hidden by sign caused a fall

What To Do?



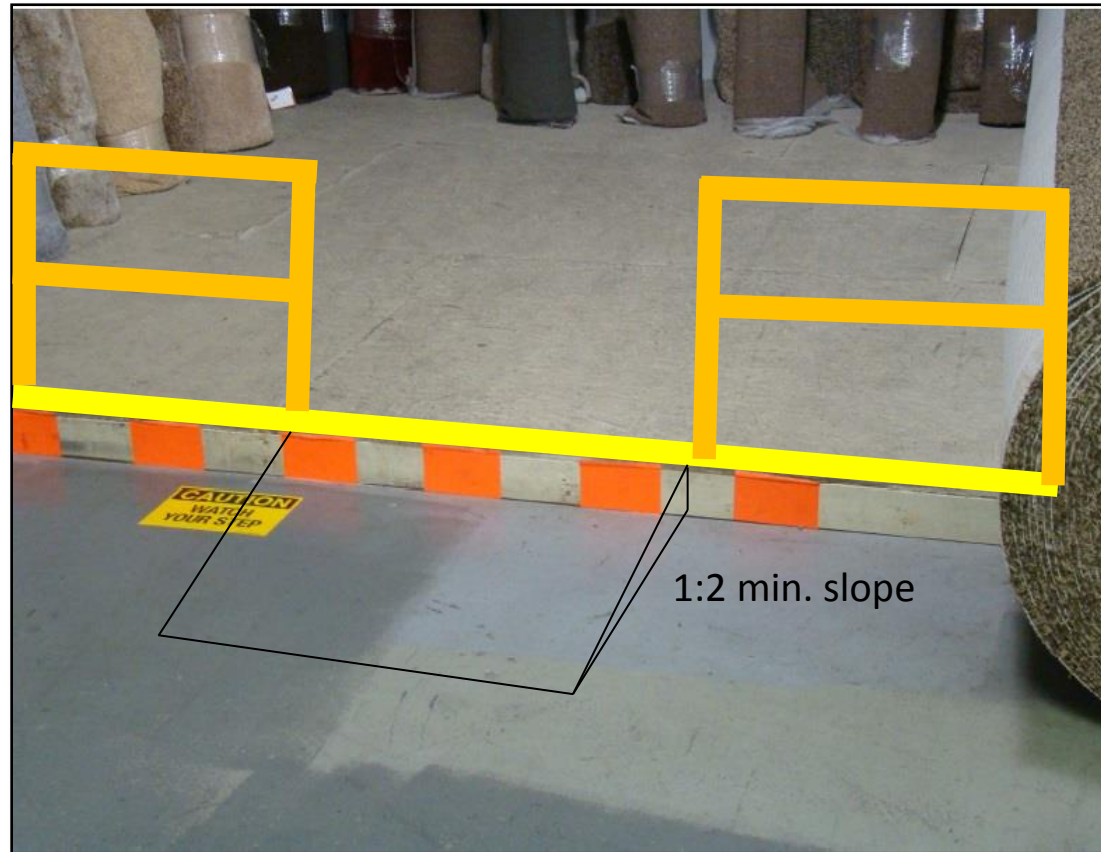
Granite steps

- Good condition
- Good lighting
- Adequate handrail

Underlying Issue?

Retail cell phone store

Highlighting Isn't a Guarantee...



Adequate warning? Customer still fell

Slip Simulator



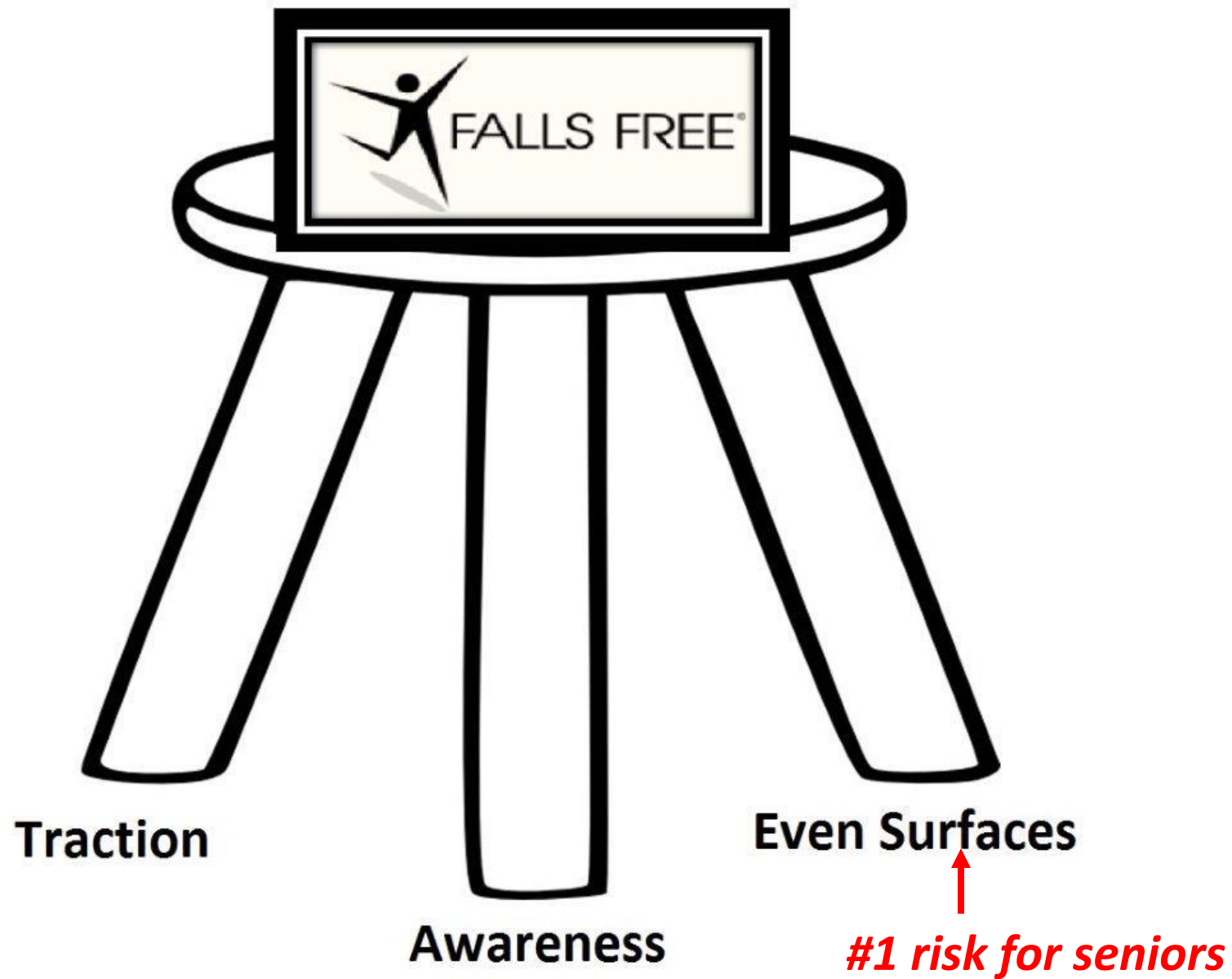
Slip Simulator



Cost approx. \$40,000

- 1. Try natural gait first*
- 2. Try again after learning new techniques:*
 - Keep head up
 - Keep shoulders over ankles
 - Take half steps
 - Walk flat-footed (not heel-to-toe)
- 3. 3rd pass with distractions introduced*
- 4. 4th pass to test new upper speed limit*

50 – 80% reduction in falls reported



Uneven Surfaces



High traffic walkway, broken arm

Repairs - Mud jacking



Same area after repairs

Uneven Surfaces



Hip/shoulder injuries

Uneven Surfaces



Flared side not identified

Solution - Awareness



Use slip-resistant additive

Obstacles



Broken jaw, brain injury

Solution - Awareness



6 feet wide, contrasting color

Confusing Markings



Broken hip

Uneven Surfaces



½" drop-off, broken hip

Beware of concrete/asphalt transitions

Uneven Surfaces



View when walking



3" change in elevation

Uneven Surfaces



1.5" raised edge

Medical Office

- ✓ Paint alone not enough
- ✓ Broken finger and had to redo disc fusion surgery
 - Depth perception?
 - Rx?
 - Eyes focused on doorway?

Uneven Surfaces



Looks okay, right?

Uneven Surfaces



5/8" raised edge = broken wrist

Uneven Surfaces



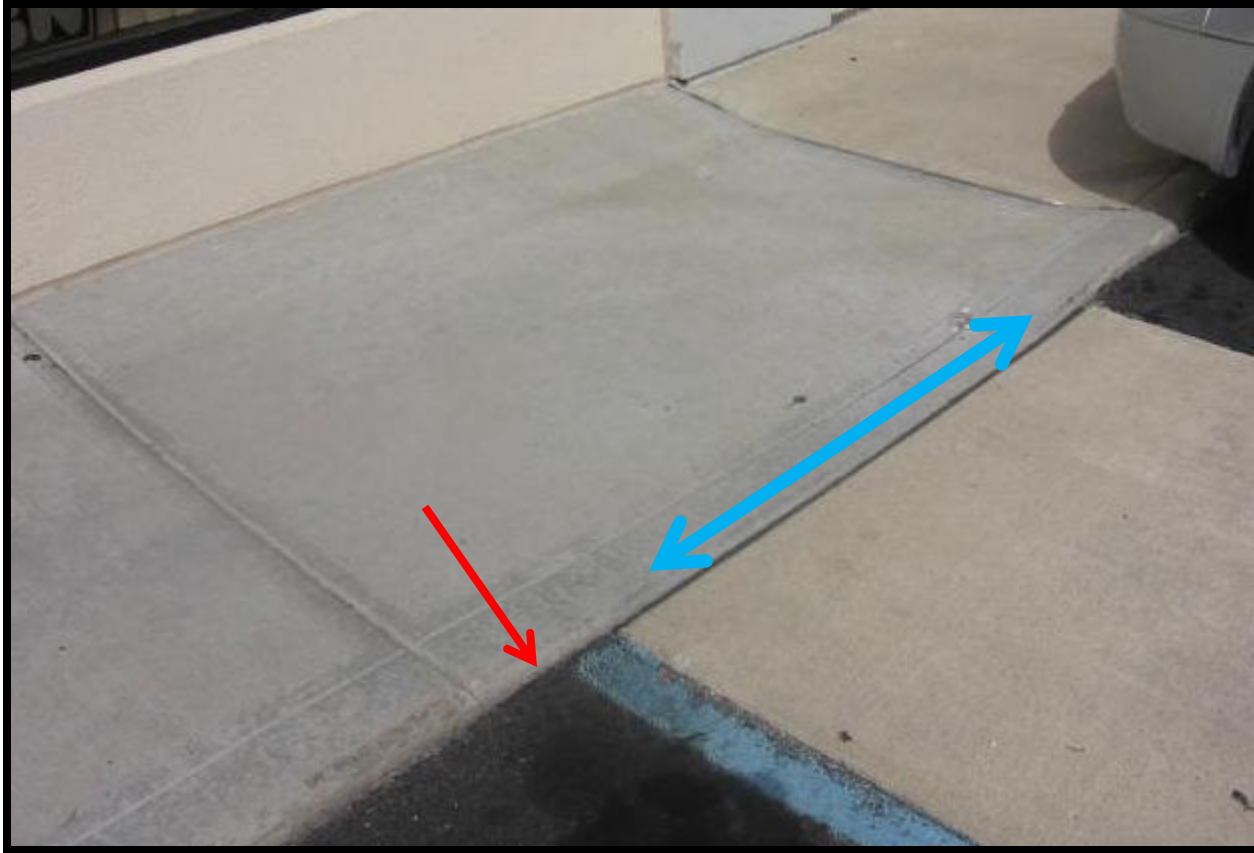
Uncovered water meter box too close

Uneven Surfaces



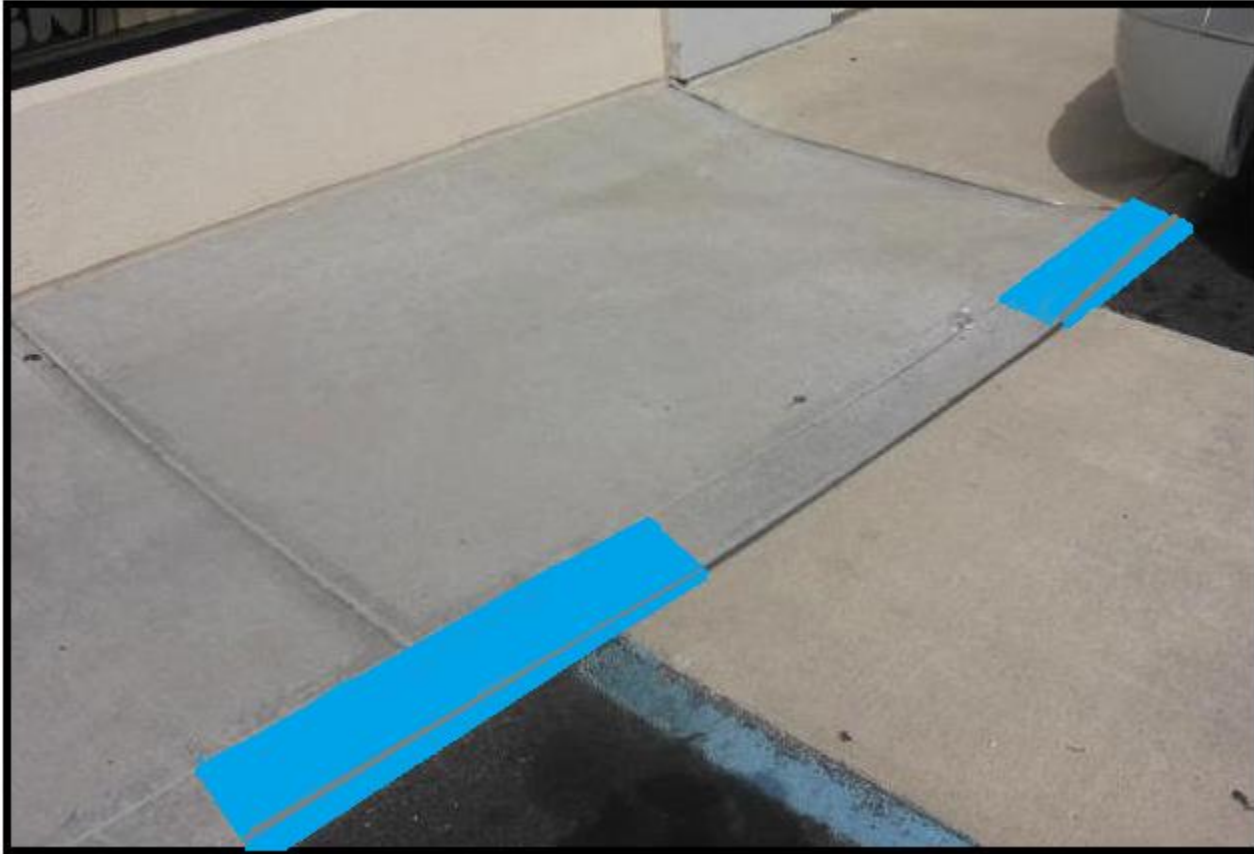
Low visibility, thin edging - shortcut

Uneven Surfaces



Fatality. Flared edges not marked

Proper Curb Marking



Uneven Surfaces



Fatality. Flared edges not marked

Uneven Surfaces



Shadows hiding flared curb

Uneven Surfaces



1" raised edge. Person with walker fell face-first

“3 Shades of Gray”



Weather will reduce visual contrast
Older pedestrians less likely to see curb

Uneven Surfaces



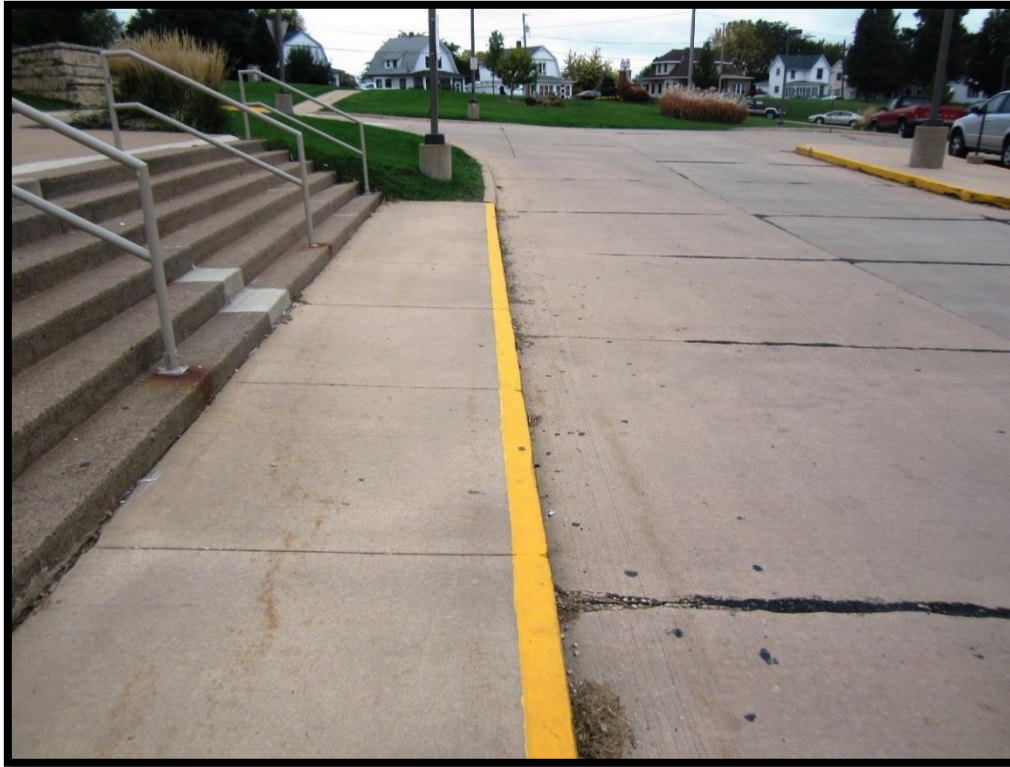
Shades of Gray – Broken Wrist



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Solution - Awareness



4" wide, contrasting color, slip resistant

Short Flight Stairs



Single step in walkway
Will cause a stumble/fall



Right idea, but....
Stripe each edge and use mineral aggregate

Uneven Surfaces



Brain Injury Facility – slab settled 2"

Uneven Surfaces



“Older” female stumbled on slope

Uneven Surfaces



Many stumbles on sloped sides

Uneven Surfaces



Slope not detected leaving store

Solution - Awareness



Paint flared sides

Uneven Surfaces



Tripped on rug, shattered shoulder ball joint

When Mats Attack



**51 year-old nurse, getting therapy (hip replaced)
“Stubbed” toe on mat, broken leg**

Mat Migration



**Use pressure sensitive adhesive
NFSI-certified mats**

Lightweights Can Be Heavy Hitters



[Lightweight mats](#)

Lightweight Lemon



61 year-old “shuffler”, shoulder and hip injuries



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Hold the Mayo

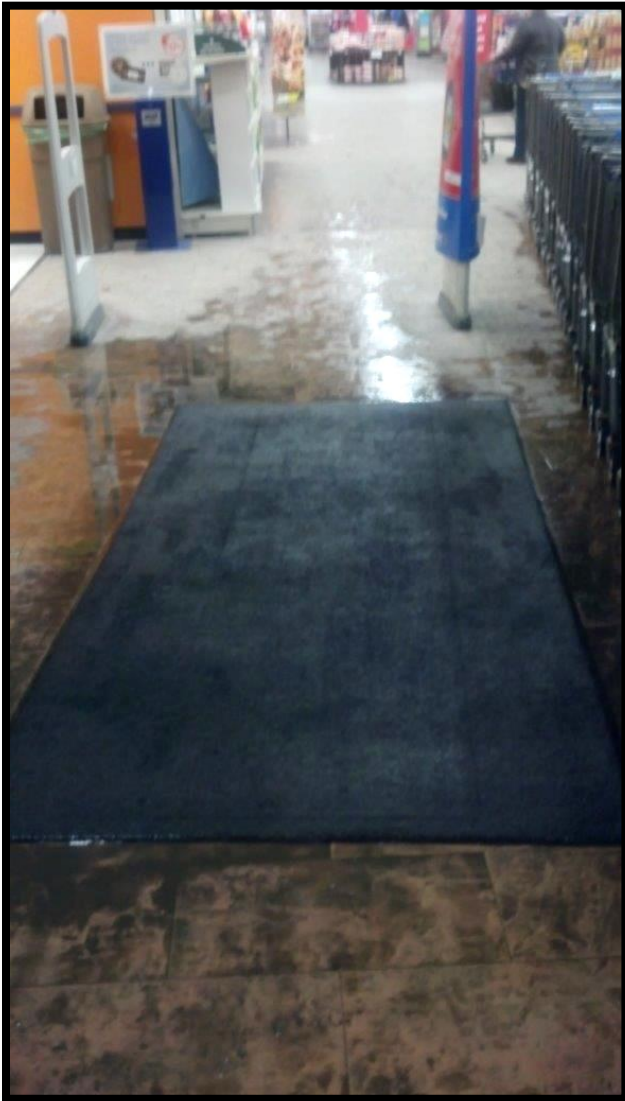


Medical facility during remodel

Gaps in Mat Placement Strategy



No Mat is an Island



Recommend:

- **30 feet mat length for snowy days**
- **Frequent change-out and/or extraction required**

Split Personality



When is a mat damaged enough to replace?

Bald is not Beautiful



When is a mat damaged enough to replace?

The “Comb-Over”



Lily Pads



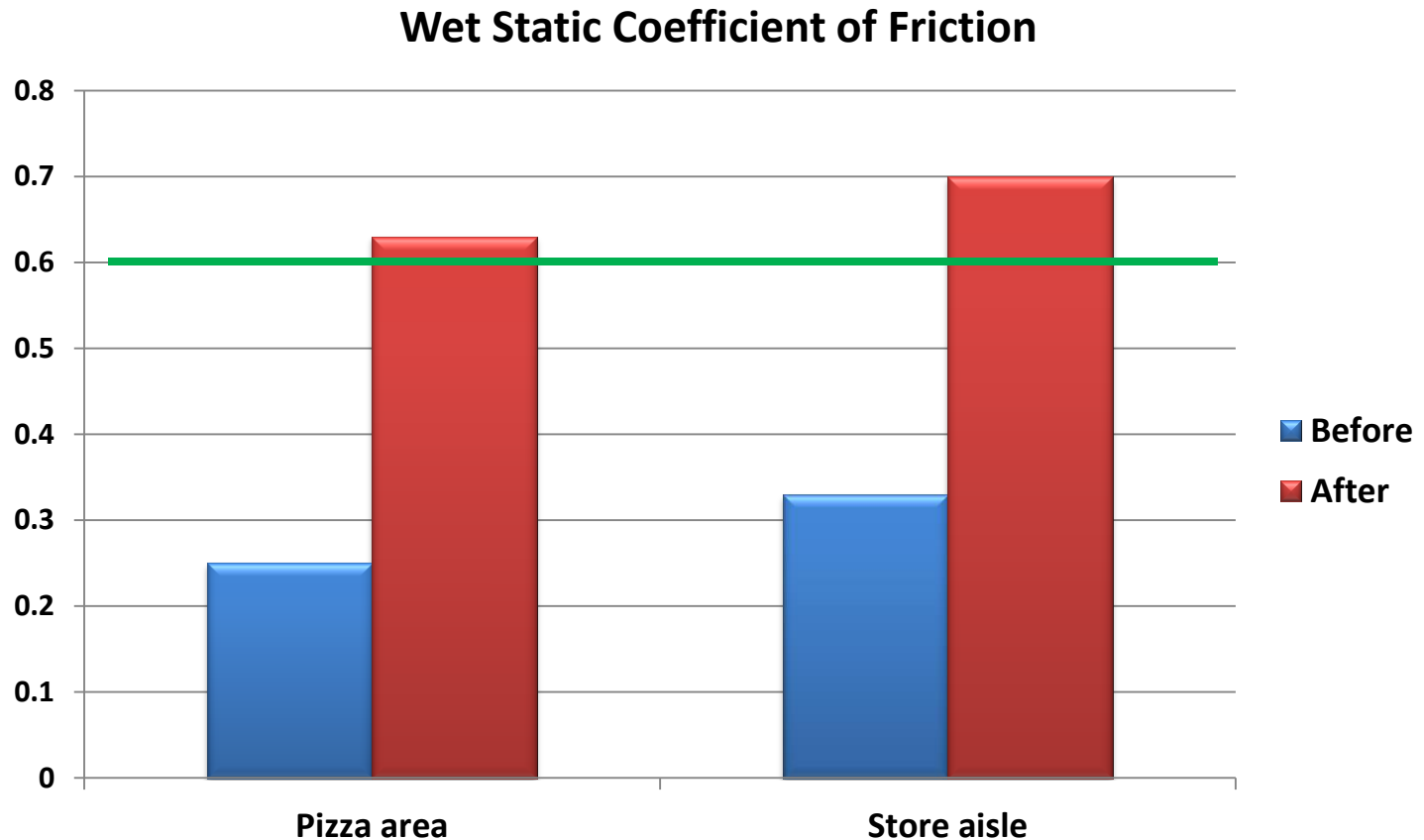
Floor Traction



ANSI/NFSI B101.0 2011: $SCOF \geq 0.6$ is high traction

ANSI/NFSI B101.3 2012: $DCOF \geq 0.4$ is high traction

Traction Treatment



Study: Every 0.1 increase in COF reduces slips by 21%

Traction



Slip resistant paint not used, was raining

Traction



**Abrupt change in traction, snowy day. Wet soles?
Shoulder and head injuries**

Solution?



Temporary solution. Should measure/enhance traction

Traction



Rainy day blues (black and blue). SCOF = 0.15

Footwear



Slip resistant footwear

Studies show at least 50% reduction in slips

Older people tend to buy shoes that are too big

- **Less control/coordination = missteps**

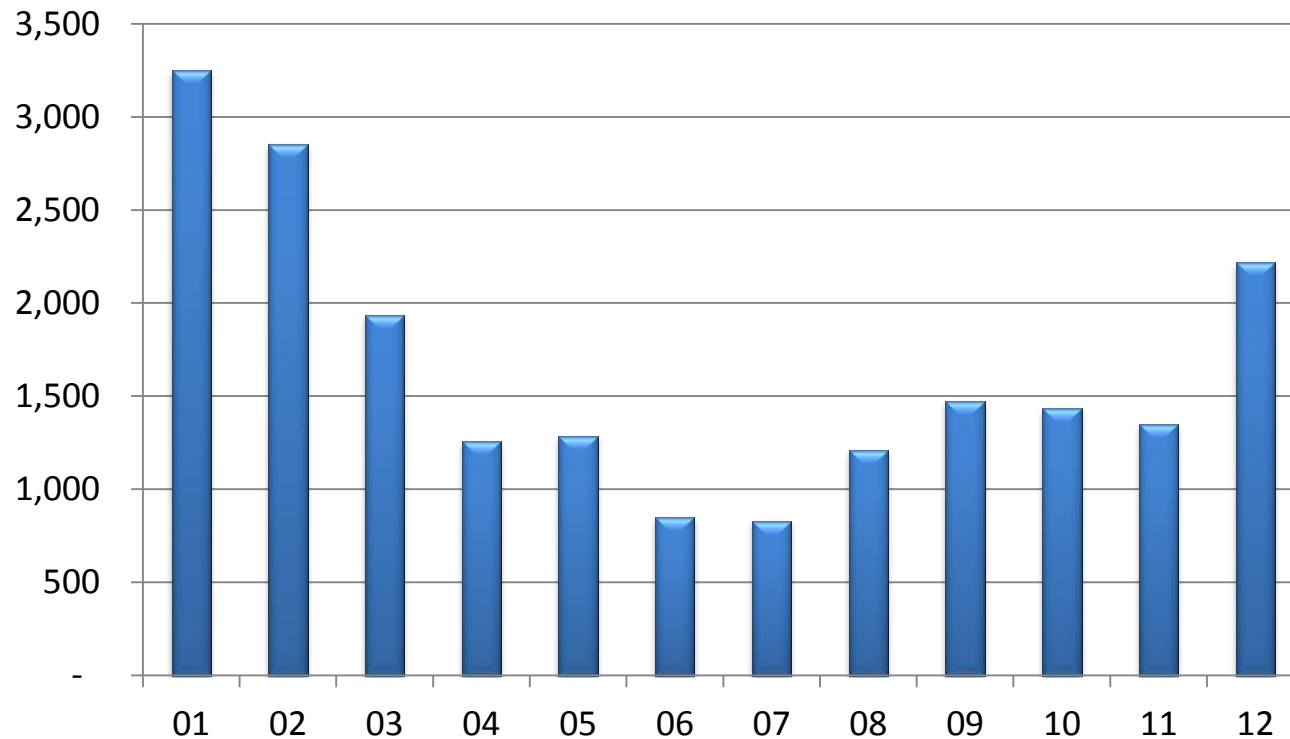
Footwear



**ANSI/NFSI B101.7 Standard Test Method for Lab
Measurement of Footwear Outsole Material Slip Resistance**

Seasonal Issues

WC Slip/Fall Claims by Month



Dec-Mar accounted for 47% of work comp slip/falls

Companywide, 2009-2013



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Snow Removal Contractor Claims Data

- **85-90% were slip/fall claims**
- **Average claim - \$13,475**
- **Most claims were at shopping centers**
- **68% of fallers are women**
- **Most claims occurred on Mondays**

ASCA, SRIB



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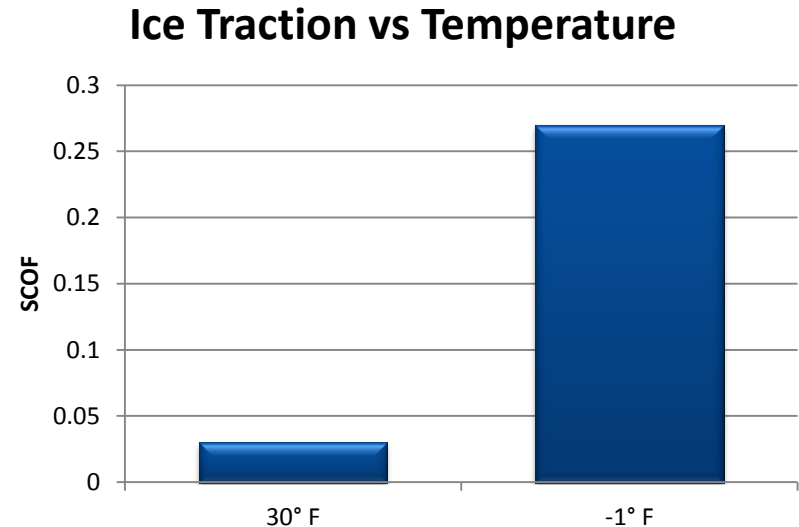


Thaw/Refreeze



37° air temperature at 6:30 am, Feb 18, 2014
15° pavement temperature

Thaw/Refreeze



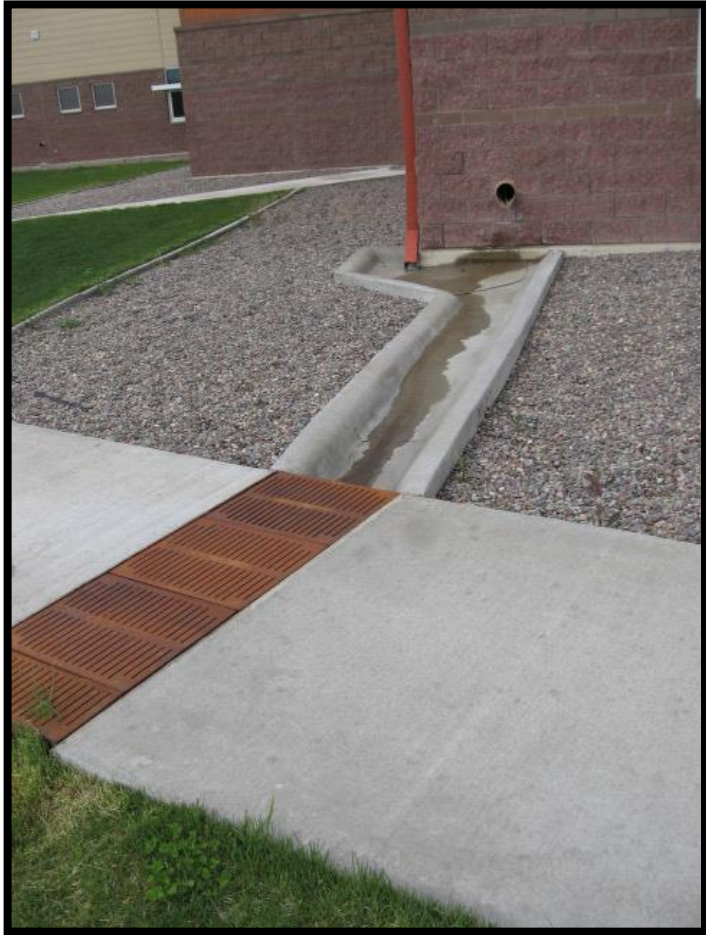
37° air temperature at 7:00 am, Mar 7, 2014
22° pavement temperature

Thaw/Refreeze



Brain Injury Facility - Poor drainage design

Possible Solutions



Ice Melt



- ✓ **Pre-apply brine when possible**
- ✓ **Shovel slush layer off after melting is done**
- ✓ **Don't use too much – use spreader**
- ✓ **Scoops and shovels result in overuse**

Specialty Coating



Pre-apply brine with tank sprayer, 2.2 lbs salt per gallon



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Ice Cleats – Not All The Same



Some unsafe for driving, ladders or indoors

Too Much Sand – Left Too Long



Slipped on sand, fractures (April)

Awareness



Duty to Care Fulfilled?

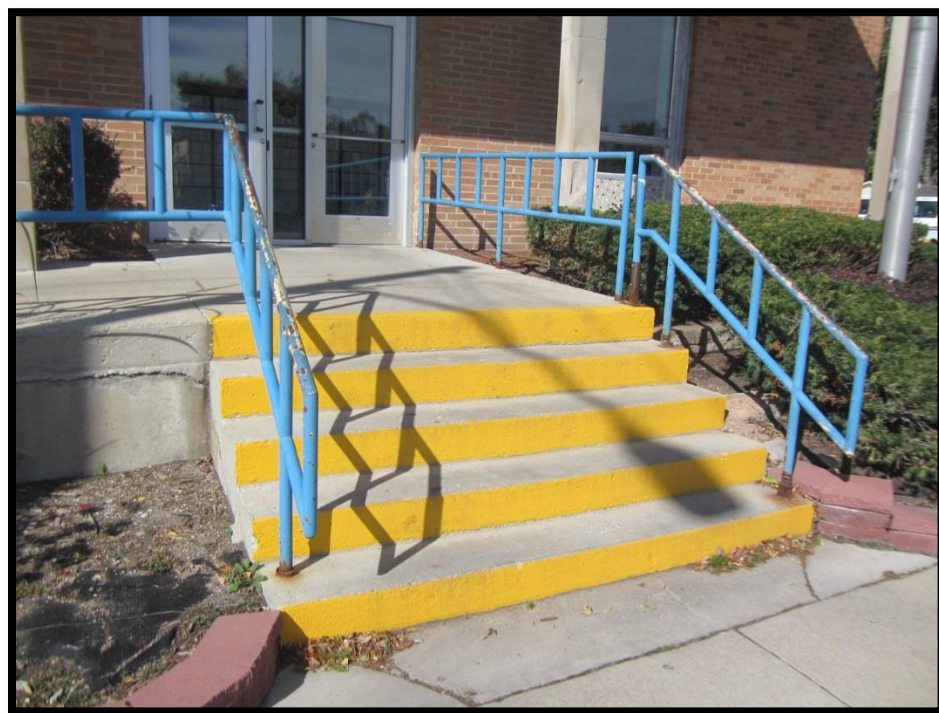


Awareness



Don't leave up too long - Remove when dry

Awareness



Highlight steps/changes in elevation

Awareness



Highlight flared curbing

Awareness



Highlight raised edges

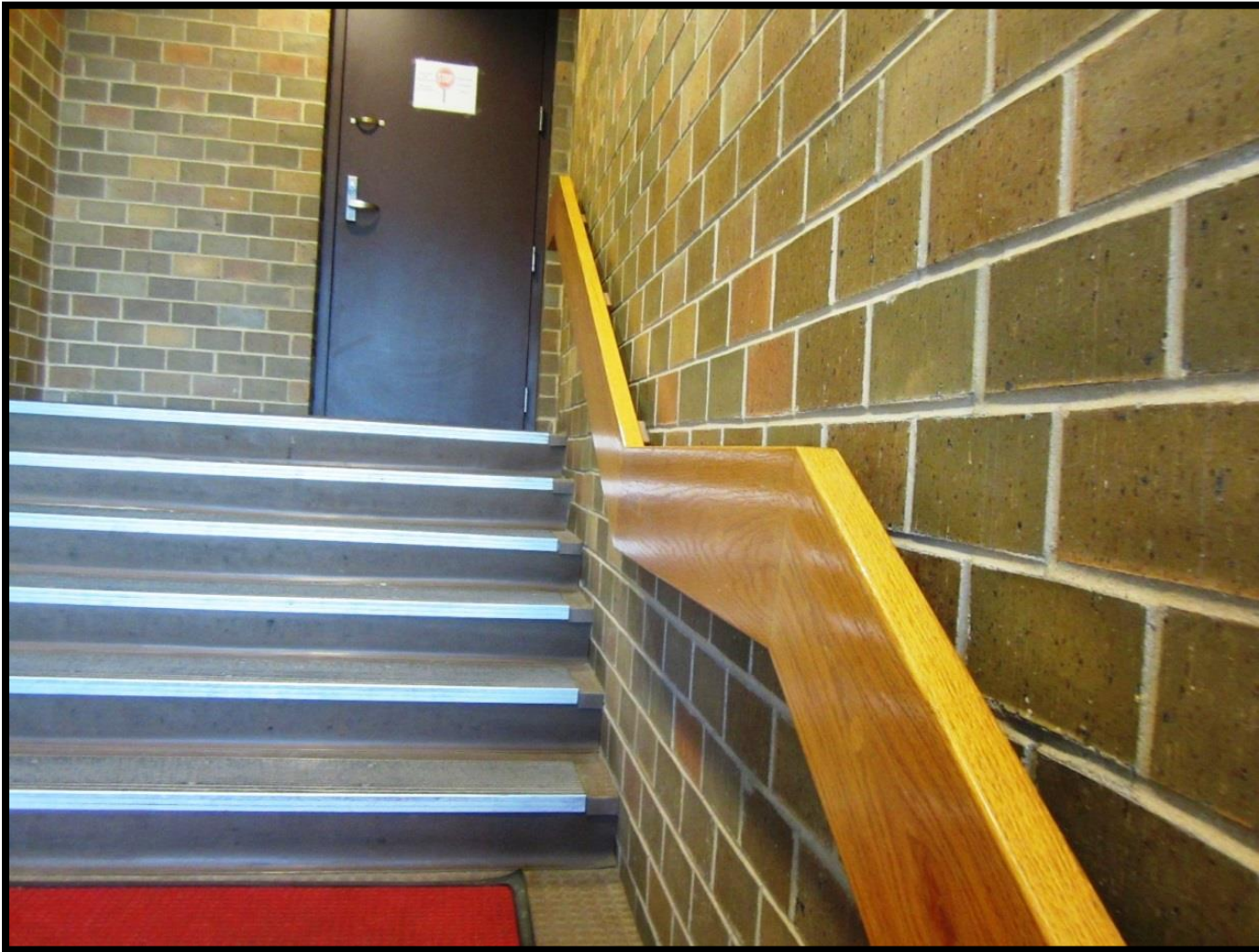
Other Issues



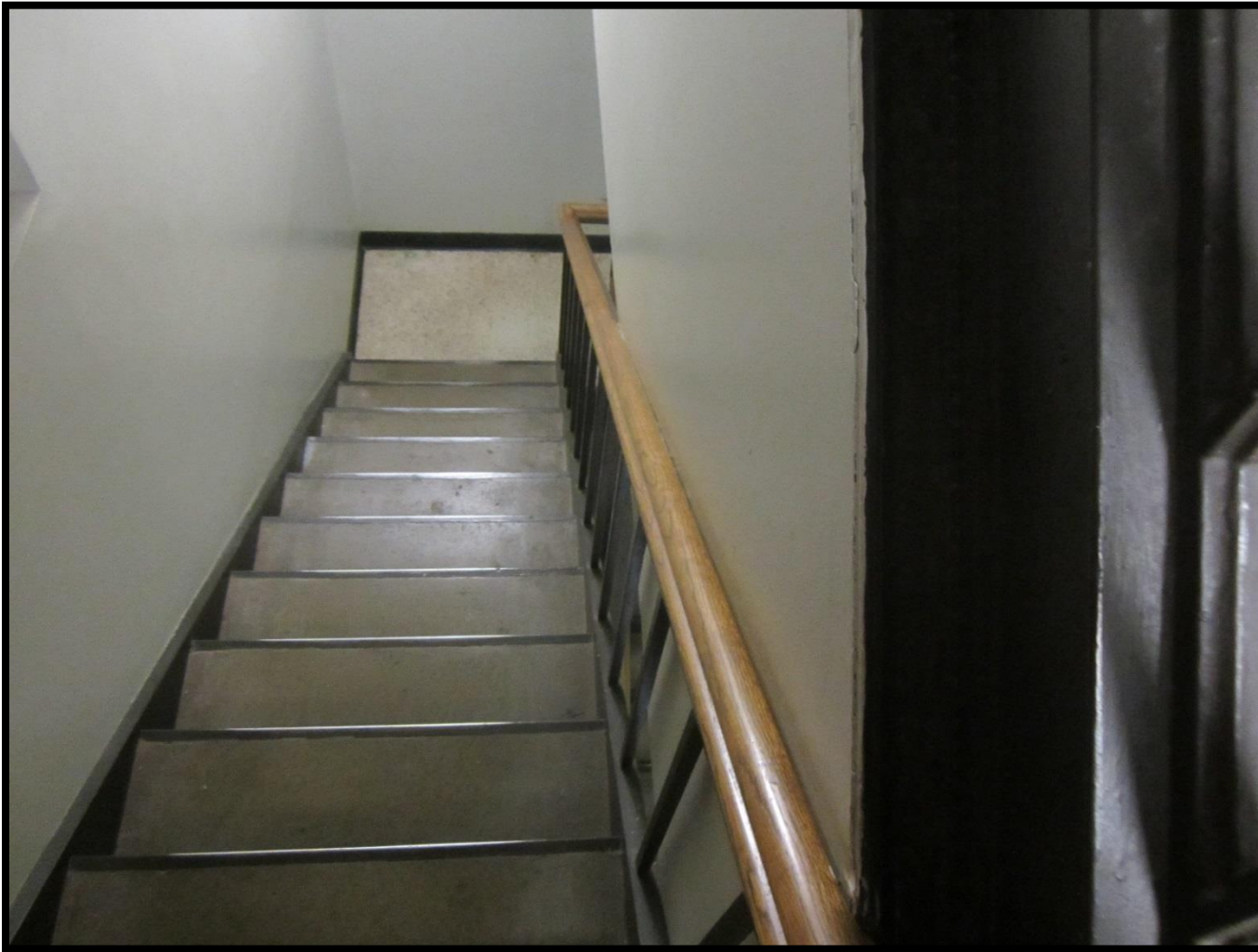
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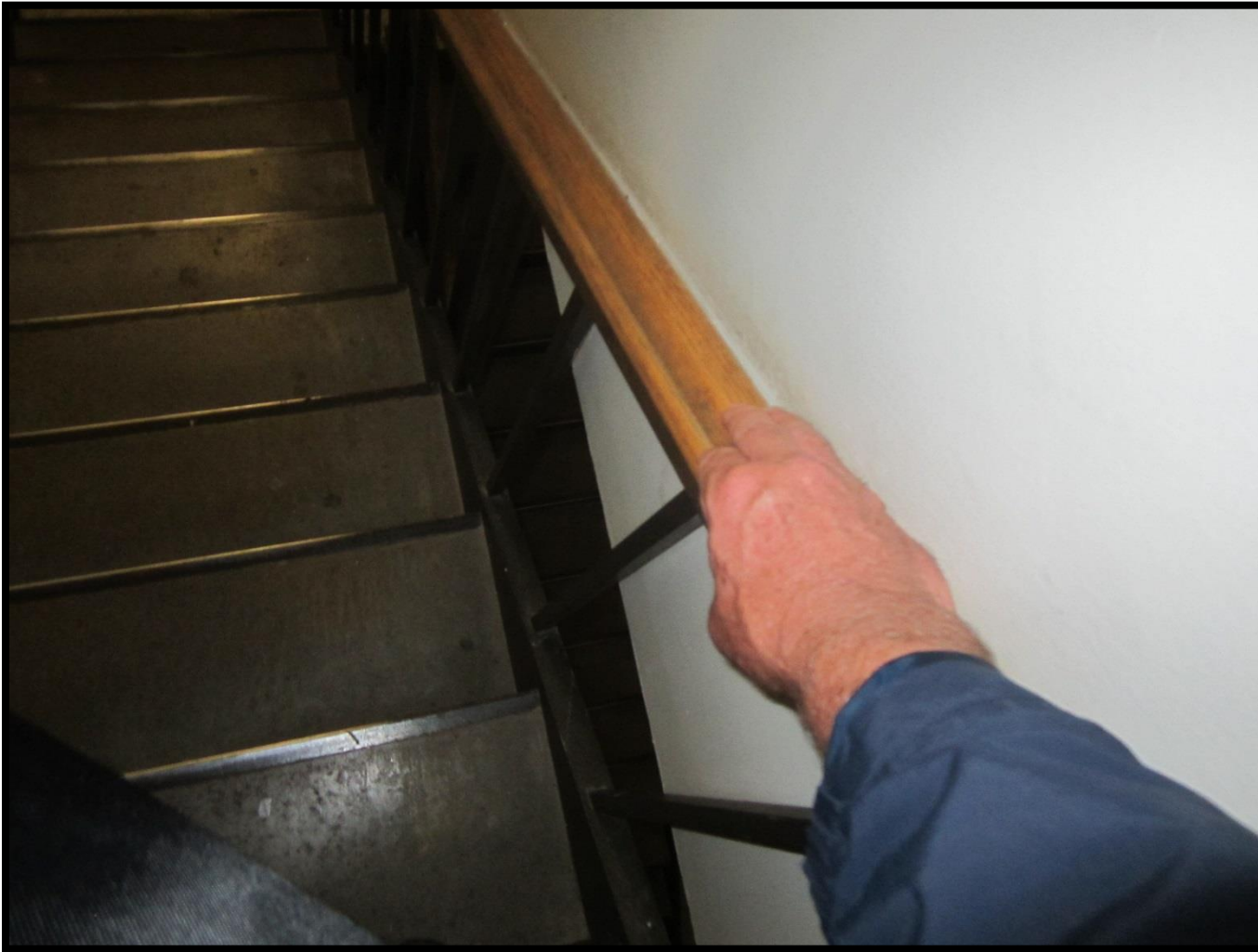
Inadequate handrails



Inadequate handrails

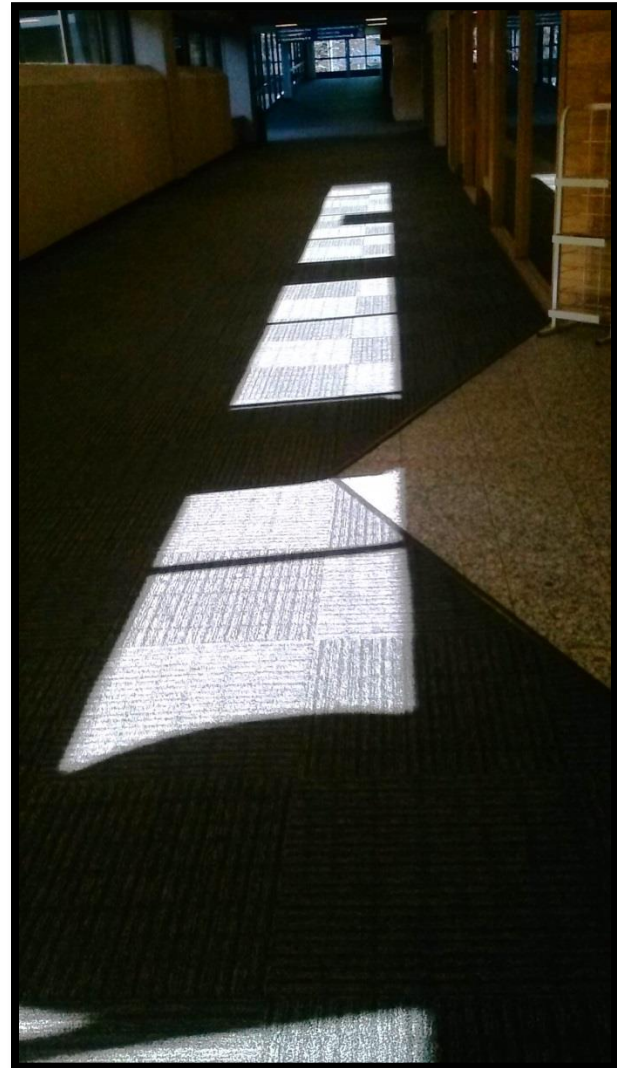


Inadequate handrails

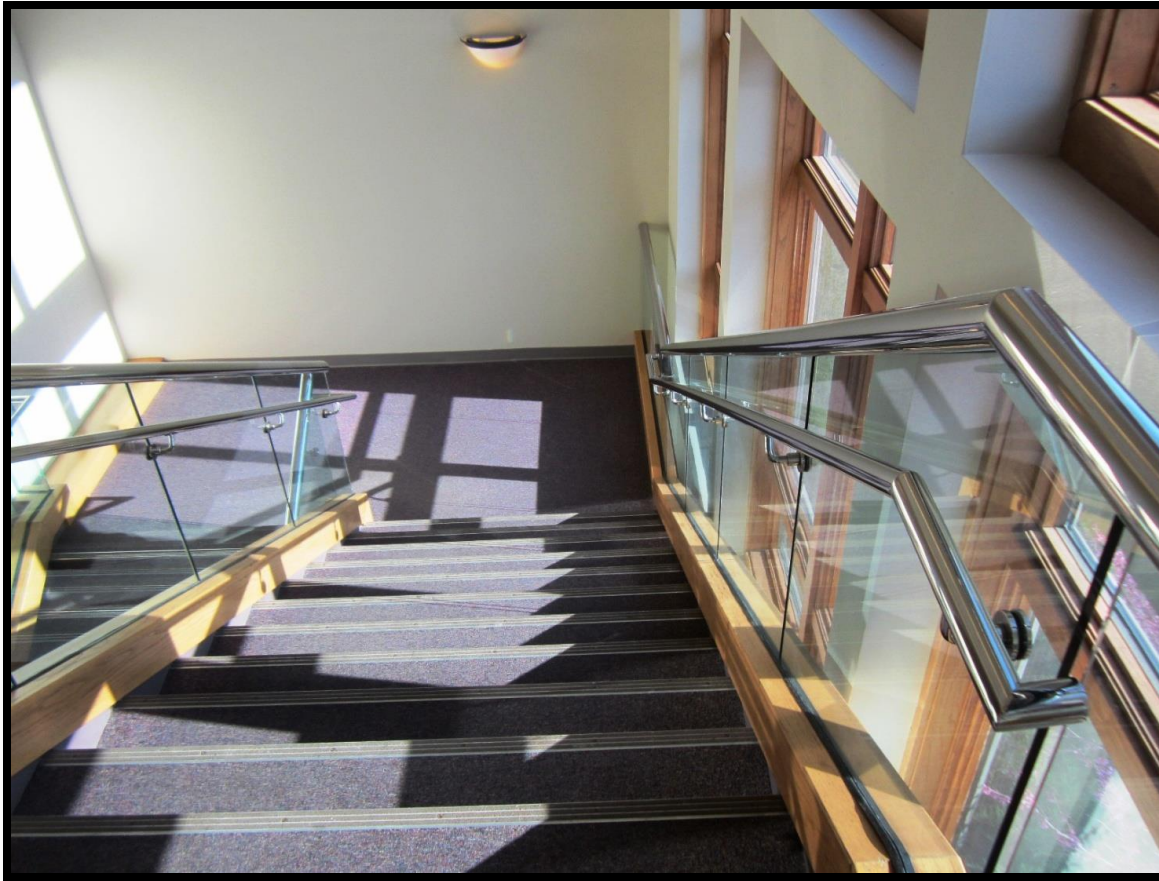


Glare

Visually confusing



Glare



Brightness extremes affect contrast/depth perception
Contrast ratio of tread/nosing approx. 5 to 1

Contrast Rules

10+ to 1 to recommended
Yellow and red best for older eyes

Normal

This box shows the colors with normal vision.

Use:

Choose a foreground color by pointing the mouse at the color the same way. If a checkmark becomes visible, the color is acceptable.

12

Normal

This box shows the colors with normal vision.

Use:

Choose a foreground color by pointing the mouse at the color the same way. If a checkmark becomes visible, the color is acceptable.

4



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